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MAILED TO RECIPIENT

December 29, 2008

Bob Bukantis
Water Quality Standards Section
Resource Protection Planning Bureau
Planning, Prevention and Assistance Division
Montana Dept. of Environmental Quality
1520 East Sixth Avenue
Helena, Montana 59620

Re: Clark Canyon Dam Hydroelectric Project FERC No. 12429-001 Section 401 Water Quality Certificate Application

Dear Mr. Bukantis,

Enclosed is the Section 401 Water Quality Certificate Application for the Clark Canyon Dam Hydroelectric Project as prepared by Symbiotics, LLC. Also enclosed is a check for $10,000 as required to process the application. Please send indication of receipt of this application to the project manager, Keith Lawrence, at *keith.lawrence@symbioticsenergy.com* as soon as it is received because the FERC will need to be notified immediately.

If you have any questions, please contact Mr. Lawrence at the above email or 801-947-0281.

Sincerely,

Brent L. Smith

Brent L. Smith
Chief Executive Officer
Rigby, ID

cc:
enclosure

Clark Canyon Dam
FERC No. 12429

Application for the Certification of Compliance with Water Quality Requirements and Standards Pursuant to Section 401 of the Clean Water Act, 33 USC 1341 and MDEQ Rule 17.30.103

Symbiotics LLC

December 2008

1.0 INTRODUCTION

Section 401 of the federal Clean Water Act stipulates that an applicant for a federal permit to conduct an activity that may result in discharge to waters of the state must provide the permitting agency with a Water Quality Certification issued by the state from which the discharge originates. A Water Quality Certification is the mechanism by which the state evaluates whether an activity may proceed and meet water quality standards. This section of the Clean Water Act is a direct delegation from Congress to the states. In doing this, Congress sought to ensure that the state has opportunity to ensure that federally approved activities meet water quality standards established by the state under the CWA. In the state of Montana, the Department of Environmental Quality (MDEQ) is the designated agency for issuing certifications. The proposed Clark Canyon Dam Hydroelectric Project (FERC No.12429) is subject to all hydroelectric project standards pursuant to 401 water quality certification within the state of Montana (Rule 17.30.103).

MDEQ guidelines under Rule 17.30.103 require the following information in an application for Section 401 Water Quality Certification, which can be found in this document under the sections indicated in parentheses:

(a) the name and address of the applicant ***(Section 2.0)***;

(b) a description of the facility ***(Section 2.0; Appendix A - Proposed Project Boundary)*** or activity and of any discharge which may result from the facility or activity, including but not limited to:

(i) the volume of the discharge ***(Section 4.0)***;

(ii) the biological, chemical, physical and radiological characteristics of the discharge ***(Section 4.0)***;

(iii) a description of the existing environment at the site of the discharge ***(Appendix B - Final License Application Exhibit E; Appendix C - Vegetation Surveys; Appendix D - Riparian Habitat Protection Plan; Appendix F - Water Quality Monitoring Summary)***;

(iv) the size of the area affected ***(Section 4.0)***;

(v) location or locations at which the discharge may enter state waters ***(Section 4.0)***; and

(vi) any environmental impact assessment, information, maps and photographs which have been provided to the licensing or permitting agency ***(Appendix B - Final License Application Exhibit E; Appendix C - Vegetation Surveys; Appendix D - Riparian Habitat Protection Plan; Appendix E - Revegetation Guidelines; Appendix F - Water Quality Monitoring Summary; Appendix G - Instream Flow Release Plan)***;

(c) a description of the function and operation of equipment, facilities, activities or practices to minimize or to treat wastes or other effluents which may be discharged, including the degree of treatment expected to be attained ***(Section 4.0)***;

(d) the date or dates on which the activity is proposed to begin and end, if known, and the date or dates on which the discharge will take place ***(Section 4.0)***; and

(e) a description of the methods being used or proposed to monitor the quality and characteristics of the discharge and the operation of equipment, facilities or activities employed in the treatment or control of pollutants ***(Section 4.0; Appendix F - Water Quality Monitoring Summary)***.

2.0 DESCRIPTION OF CURRENT FACILITIES

The location of the project is:

State:	Montana
County:	Beaverhead
Nearby Town:	Dillon, MT
Stream:	Beaverhead River

The exact name, address and telephone number of the Applicant is:

Symbiotics, LLC
PO Box 535
Rigby, ID 83442
Phone: (208) 745-0834
Fax: (208) 745-0835

The exact name, address and telephone number of each person authorized to act as agent for the Applicant in this application is:

Mr. Brent L. Smith, President
Northwest Power Services, Inc.
PO Box 535
Rigby, ID 83442
Phone: (208) 745-0834
Fax: (208) 745-0835

Dr. Vincent A. Lamarra or Keith Lawrence
Symbiotics, LLC
975 South State Highway
Logan, UT 84321
Phone: (435) 752-2580
Fax: (435) 752-2581

Clark Canyon Dam was completed in 1964 as part of the U.S. Bureau of Reclamation (Reclamation) Pick-Sloan Missouri Basin Program, East Bench Unit which was authorized by the Flood Control Acts of 1944 and 1946. The dam is a zoned, earthfill structure at the head of Beaverhead River about 20 miles southwest of Dillon, Montana (Figure 1).

The project provides irrigation storage, flood control and recreational opportunities. Regulation of reservoir and corresponding water releases are made in accordance with standard operating procedures developed by Reclamation. The East Bench Irrigation District (EBID) is responsible for operation of the dam and reservoir in close coordination with Reclamation.

The dam has a structural height of 147.5 feet and a crest length of 2,950 feet (Table 1). The spillway consists of an approach channel, concrete inlet channel, un-gated concrete crest, concrete chute, concrete stilling basin, and an outlet channel. Capacity of the spillway is 9,520 cubic feet per second (cfs) at a water surface elevation of 5,571.9 feet MSL.

The outlet works has an approach channel, concrete intake structure, concrete conduit, a gate chamber with four 3-by-6.5-foot high pressure gates (2 emergency gates), concrete access shaft house, and a concrete stilling basin. The outlet and spillway use the same discharge channel. The concrete-lined conduit is 9 feet in diameter. The capacity of the outlet works is 2,325 cfs at a water surface elevation 5,547 feet MSL.

The reservoir has a total capacity of 257,152 acre-fee, an active capacity of 126,117 acre-feet, and a surface area of 4,935 acres.

Figure 1. The proposed project location.

Table 1. Hydrologic and physical data for Clark Canyon Dam.

General	
Drainage area	2,315.0 square miles
Pool Elevations, MSL	
Active conservation pool	5,535.7 ft
Joint use pool	5,535.7 ft
Flood control pool	5,560.4 ft
Maximum pool	5,571.9 ft
Reservoir Capacity	
Flood control pool	257,152 acre-ft
Active conservation pool	126,117 acre-ft
Dam	
Type	Zoned earthfill
Crest length	2,950 ft
Crest elevation (NGVD)	5,578.0 ft
Crest width	36 ft
Maximum height	147 ft
Spillway	
Type	Uncontrolled crest
Crest length	67 ft
Crest elevation	5,560.4 ft
Design discharge	9,520 cfs
Outlet Works	
Type gates	4 high-pressure gates
Capacity at full pool	2,325 cfs
Date of Completion	Fall 1964

3.0 PROPOSED OPERATIONS

3.1 Proposed Modifications and New Facilities

A previous License Application (FERC Project No. 7664) was filed with FERC in 1986. The License was issued by FERC on June 24, 1988. As part of the previous license, an Environmental Assessment was completed on May 23, 1988 with a finding no significant impact as the project was proposed. After License issuance, avoided cost rates were sufficiently low that the project was viable.

The proposed Clark Canyon Dam Hydroelectric Project will have an installed generating capacity of 4.75 megawatts (MW). The project will utilize the normal regulated flow releases ranging from 87.5 to 700 cfs. Gross operating hydraulic head for the two turbine/generator units will range between 60 and 95 feet. No modifications will be made to present structures upstream of the existing project outlet regulating gates. All proposed structure modifications and additions will be limited to the outlet conduit downstream of the regulating gates. A drawing of the proposed project boundary and major features is attached as Appendix A.

Conduit

The proposed project requires the installation of a steel liner in the existing 9-foot concrete outlet conduit. The steel liner will be pressure-grouted to the existing concrete outlet conduit structure. A new outlet gate structure will be installed at the end of the existing outlet portal to maintain hydraulic pressure to the turbine/generator units. The outlet conduit will be bifurcated upstream of the new regulating valve to provide for a 9-foot diameter penstock to convey water flow to the powerhouse. A single, 9-foot diameter isolation valve will be installed in the penstock immediately downstream of the bifurcation to isolate the power generation facilities from the dam outlet works for safety and maintenance purposes. The 9-foot diameter steel penstock will be divided into an 8- foot diameter steel penstock and a 6-foot diameter steel penstock directing flow to the hydraulic turbine units about 70 feet from the bifurcation.

Powerhouse

The powerhouse building containing the turbine generator units and associated control equipment will be located on the south side of the present spillway stilling basin. The 30-by-50 foot powerhouse will consist of a concrete substructure and a textured, concrete block above grade to blend with the area's visual aesthetics. In addition to the turbine/generator equipment, the building will house all the associated control equipment, backup battery power systems, operating console, and operator office.

Draft Tubes

The turbine discharge will be directed into the spillway stilling basin.

Use of Impoundment

The proposed project requires no modification to existing project uses and will utilize the normal released flows to produce hydroelectric power. Therefore, the area and capacity of the impoundment will not be affected by operation of the proposed facility. No change will occur to the reservoir pool elevations or downstream river flow.

Proposed Turbines and Generators

The initial analysis of hydrologic data and corresponding computations for project capacity resulted in a recommended capacity of 4.75 MW. Based upon the average daily hydraulic head and corresponding flow data, a vertical Francis type hydraulic turbines were selected. Each unit will incorporate variable wicket gates in order to accommodate the wide range of flows and hydraulic head. The 3 MW and 1.7 MW capacity units will optimize the power generation for the projected flow regimes. It is projected that the annual electrical energy production will be 16.5 gW hours (16,546,237 kilowatt hours).

3.2 Transmission Lines

A 0.1-mile overhead transmission line will connect the project to the local utility transmission system using wooden poles and stand-off insulators as dictated by electric utility standards. There is some potential, however, that this line may be buried via the same route along the access road (Appendix A).

3.3 Description of Operations

The proposed hydroelectric project will function in a "run-of-reservoir" mode with no daily storage for power generation. The fundamental criterion for project development was to utilize only the regulated releases that occur under normal Reclamation guidelines as if no power generation facilities were constructed. It is anticipated that power generation will be seasonally dictated as flow regimens, lake levels, etc., are set forth by Reclamation. From the historic data, turbine/generator systems were tentatively selected and sized to maximize electrical energy production from the proposed facility.

In a letter dated January 10, 2005, Montana Fish, Wildlife & Parks' (MFWP) stated:

> *"Montana Fish, Wildlife & Parks (FWP) does not view the proposed retrofit of the existing structure as a new or additional threat to fisheries or fish habitat in the river or the reservoir under the caveat that power generation would only occur within normal irrigation or flood control release and storage regimes. Installation of the project holds a potential, however, to substantially benefit fish habitat in the river if it was accompanied by an increased minimum instream flow release exceeding the current 25 cfs minimum associated with the irrigation project. It could be beneficial to reservoir fisheries and recreation if it included the incorporation of a minimum reservoir storage pool which is currently not associated with the irrigation project."*

The Applicant believes that such changes to the operation of the irrigation project would be beneficial to the fisheries and fish habitat in the area and also could increase project power generation. However, this project is proposed as a "run-of-reservoir" project. As such the project does not propose to change when or how water is released, using only available released water to generate power.

4.0 CERTIFICATION ISSUES

4.1 Description of Existing Environment

On July 31, 2006 the Applicant filed a Final License Application with the FERC. A description of the existing environment at the project site was provided as Exhibit E of the application. The Exhibit E includes a description of geology, soils, hydrology, water quality, fisheries, vegetation, wildlife, recreation and aesthetic resources. This has been included under Appendix B. Later surveys were conducted to better describe existing vegetation, particularly the potential presence of sensitive species, and this has been included under Appendix C.

4.2 Construction Areas and Potential Discharge

The following table summarizes the estimated surface area of disturbed ground and the volume of excavated material, if any, generated at construction areas shown in Appendix A.

Table 2. Estimated surface area and associated volume of excavated material in proposed construction areas.

Construction Area	Surface Area (acres)	Excavated Volume (cubic yards)
Staging area	1.49	No excavation
Powerhouse	0.30	6,100
Sedimentation basin	0.06	340
Transmission line	0.77	642, if buried; no excavation if overhead
Access road	0.13	No excavation
Parking/transformer pad	0.02	No excavation, part of powerhouse backfill

Excavation is expected to occur in association with the powerhouse primarily, and possibly with the transmission line if it is constructed below ground. There will also need to be some excavation to accommodate a sedimentation basin to receive any discharge which may accumulate within the powerhouse excavation from precipitation or seepage from the dam. Excavated material will be used to build a 4-ft high berm around the basin, which will be located just to the east-southeast of the powerhouse excavation. The dimensions of the sedimentation basin are proposed to be 100 ft by 25 ft by 4 ft deep with 2:1 side slopes (Figure 2), which will be sufficient to contain 10,000 cubic ft of water. This will be more than adequate to accommodate runoff from the limited areas of excavation following a 10-year, 24-hour precipitation event. Water pumped into this basin via submersible pumps within the powerhouse excavation will be discharged into upland vegetation to the south and east of the basin using a standpipe or riser outlet. From there, it will either infiltrate into the soil or be filtered through the upland and riparian vegetation before discharging into wetlands bordering the original Beaverhead River channel, located further to the east. These wetland areas are depicted in a Riparian Habitat Protection Plan that was submitted to and approved by the resource agencies in September 2008 (Appendix D). The locations of the staging area and sedimentation basin avoid these wetland areas.

Excavated material that will be used to backfill the powerhouse excavation will be stockpiled temporarily within the staging area (Appendix A). Prior to initiation of excavation, the topsoil or surface foot of soil material will be removed and stored separately from the spoil material. The surface of the stockpile will be kept moist or covered to prevent wind erosion.

A shallow berm will surround the base of the spoil stockpile to retain runoff. Silt fences or straw bale barriers (Figure 3) will be installed: 1) around the topsoil and spoil stockpiles, 2) between the staging area and the access road, and 3) on the east side of the sedimentation basin to control potential stormwater runoff.

All spoil material generated during construction will either be used eventually as backfill or permanently disposed of offsite. Topsoil will be reapplied to the disturbed surface and revegetation measures will be implemented as described in Appendix E.

4.3 Water Quality

Several water quality parameters may be affected during various phases of construction. These include temperature, dissolved oxygen and turbidity. Temperature and dissolved oxygen may be affected during installation of the steel penstock liner.

During installation and pressure-grouting of the liner, construction of the bifurcation leading to the powerhouse turbines and installation of associated valves, water will need to be bypassed around the existing penstock to the Beaverhead River. It is estimated that these efforts will require approximately 8 to 12 weeks to complete. Pumping would occur from October to December of 2009 or 2010, most likely 2010, depending on the timing of FERC licensing. Previous temperature and dissolved oxygen profiles in Clark Canyon Reservoir from studies conducted in 2007 (Appendix F) indicate that vertical mixing has occurred by late September. Therefore, water may be withdrawn from any reservoir depth without effects on temperature or dissolved oxygen downstream. In 2008, additional water quality data was collected in both Clark Canyon Reservoir and the Beaverhead River at various locations downstream to augment baseline information. This monitoring will continue into April 2009, at which time a comprehensive water quality data summary will be provided to the resource agencies.

A complete description of these pumping activities that will take place during installation of the penstock liner and bifurcation is provided in the Instream Flow Release Plan (Appendix G) which was requested by the FERC and approved by the resource agencies in October 2008. The plan calls for continuous monitoring of temperature and dissolved oxygen through this and all phases of construction. Monitoring would occur within 100 yards downstream from the powerhouse excavation at site BR01, which is described in the Water Quality Monitoring Report (Appendix F). This is the uppermost site in Figure 1 of that report.

Total dissolved gases may also be affected both during the discharge of pumped water, which will be released down the existing spillway, and is it passes through the new pressurized penstock. Although measurable entrainment of air is considered unlikely, it is proposed that total gas pressure also be monitored throughout all phases of construction.

Potential stormwater runoff during various construction activities described in Section 4.2 may affect turbidity levels in the Beaverhead River. Proposed erosion control and discharge management measures should reduce potential effects; however, turbidity will be monitored during all phases of construction at the same site described above to address potential concerns. In addition, discharge from the sedimentation basin will need to be monitored for turbidity hourly or at least daily as it occurs in order to conform to NPDES permitting regulations.

4.4 Summary

It is estimated that construction will take approximately 18 months to complete. Construction activities which may affect water quality at the project site include: 1) powerhouse excavation; 2) conduit lining; 3) staging area construction and use; 4) sedimentation basin construction; 5) parking/transformer pad construction; 6) access road use; and 7) potential transmission line burial. The timing of construction will depend on when the FERC license is eventually issued, but is likely to begin in 2010.

Continuous water quality monitoring is proposed throughout construction at one site located approximately 200 feet downstream of the powerhouse excavation. Parameters would include temperature, turbidity, dissolved oxygen and total gas pressure, any of which may be affected during particular construction phases. The Applicant is proposing that erosion control measures and the use of a sedimentation basin, with NPDES-approved discharge being pumped onto upland vegetation and eventually discharged into surrounding wetlands, be used to control potential stormwater runoff. During operations, temperature, dissolved oxygen and total gas pressure would be monitored continuously for a period of time as dictated under the FERC licensing conditions.

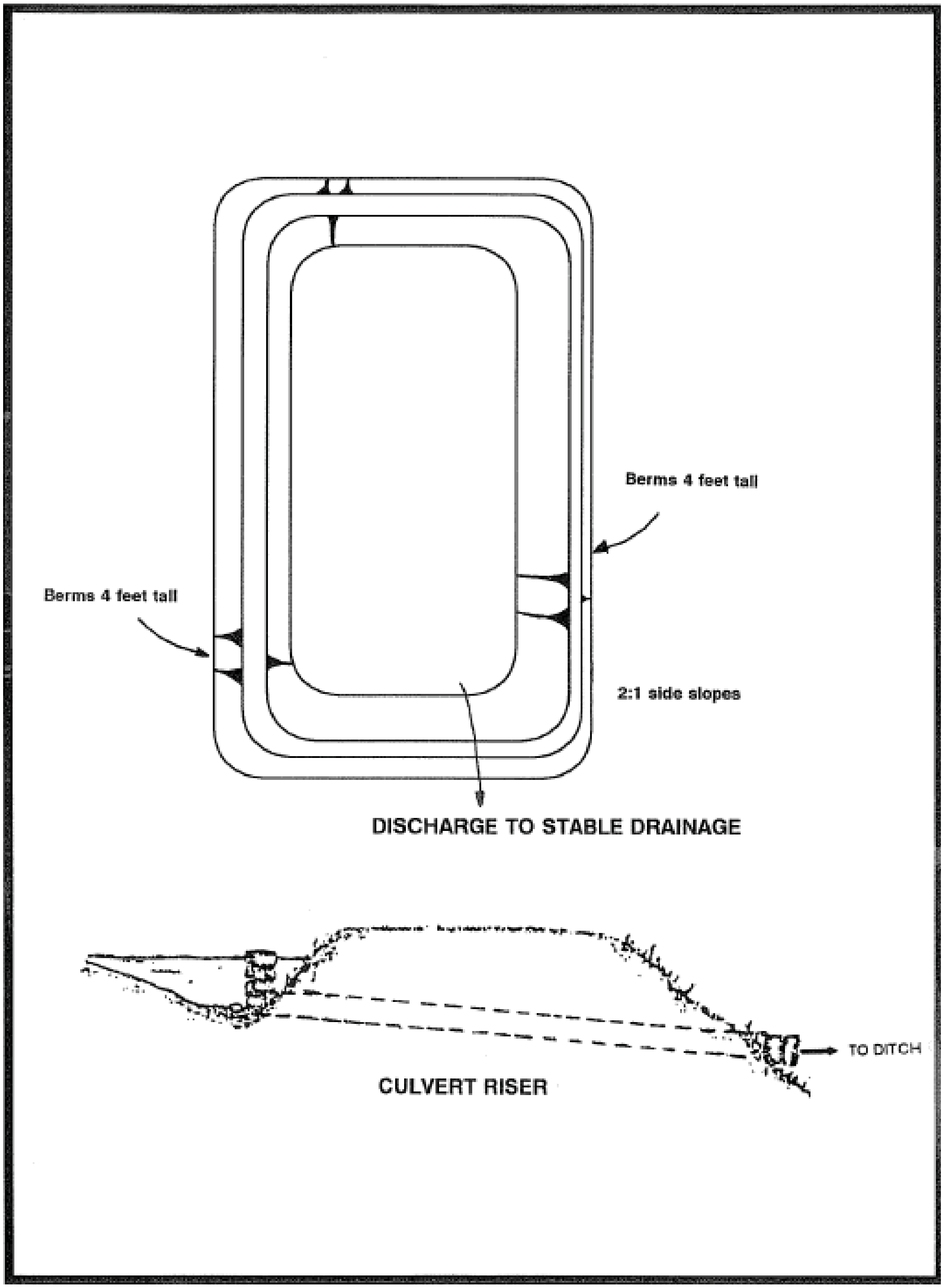


Figure 2. The sedimentation basin and riser or standpipe outlet to be used at the Clark Canyon Hydroelectric Project.

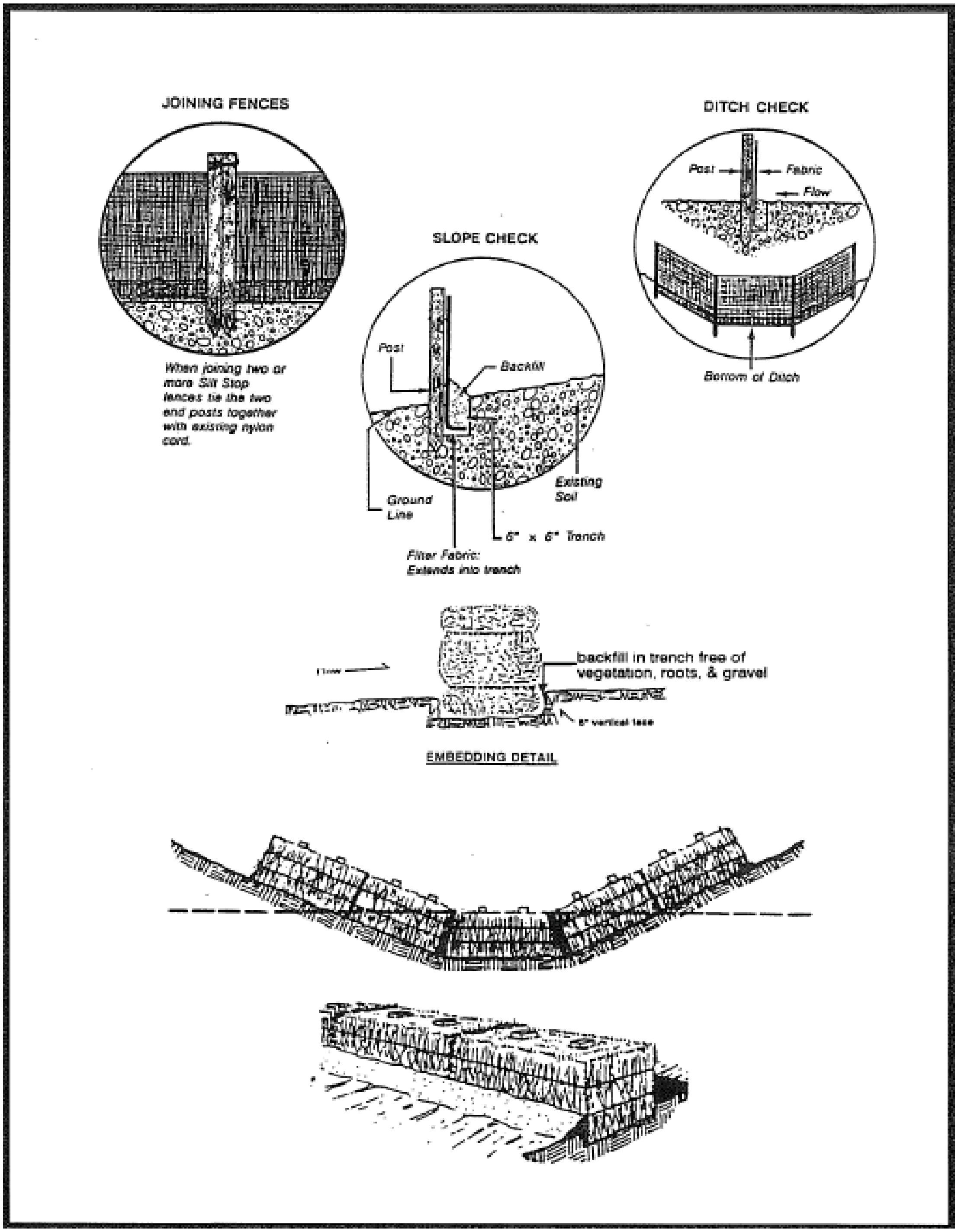
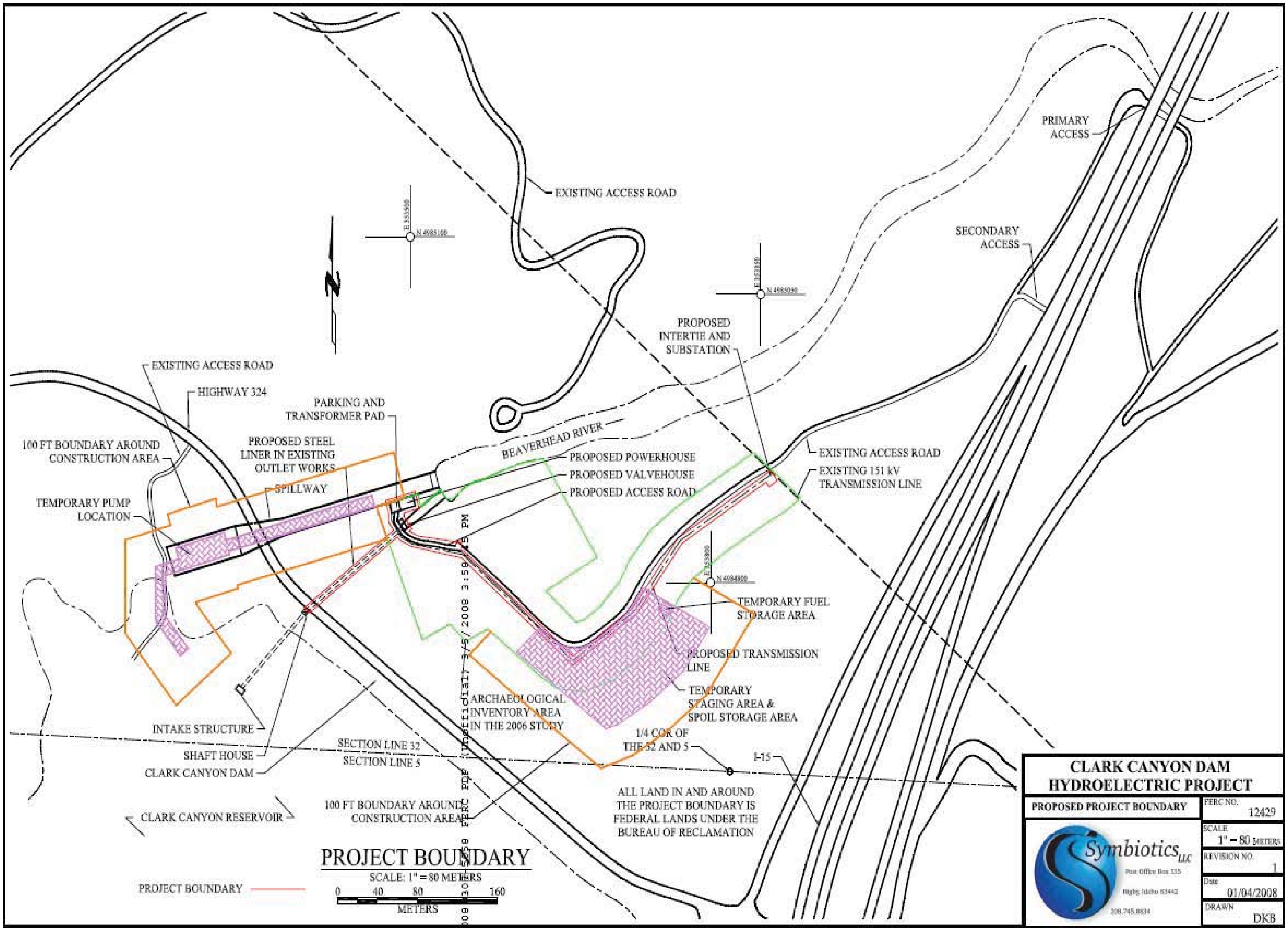


Figure 3. Silt fences and straw bale barriers to be used at the Clark Canyon Hydroelectric Project.

APPENDIX A
Proposed Project Site Diagram


EXISTING ACCESS ROAD
PRIMARY ACCESS
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PROPOSED INTERTIE AND SUBSTATION
EXISTING ACCESS ROAD
HIGHWAY 324
PARKING AND TRANSFORMER PAD
100 FT BOUNDARY AROUND CONSTRUCTION AREA
PROPOSED STEEL LINER IN EXISTING OUTLET WORKS
SPILLWAY
TEMPORARY PUMP LOCATION
BEAVERHEAD RIVER
PROPOSED POWERHOUSE
PROPOSED VALVEHOUSE
PROPOSED ACCESS ROAD
EXISTING ACCESS ROAD
EXISTING 151 kV TRANSMISSION LINE
TEMPORARY FUEL STORAGE AREA
PROPOSED TRANSMISSION LINE
TEMPORARY STAGING AREA & SPOIL STORAGE AREA
ARCHAEOLOGICAL INVENTORY AREA IN THE 2006 STUDY
INTAKE STRUCTURE
SHAFT HOUSE
CLARK CANYON DAM
SECTION LINE 32
SECTION LINE 5
1/4 COR OF THE 32 AND 5
I-15
CLARK CANYON RESERVOIR
100 FT BOUNDARY AROUND CONSTRUCTION AREA
ALL LAND IN AND AROUND THE PROJECT BOUNDARY IS FEDERAL LANDS UNDER THE BUREAU OF RECLAMATION
PROJECT BOUNDARY
SCALE: 1" = 80 METERS
0 40 80 160
METERS
PROJECT BOUNDARY
CLARK CANYON DAM HYDROELECTRIC PROJECT
PROPOSED PROJECT BOUNDARY
FERC NO. 12429
SCALE 1" = 80 METERS
REVISION NO. 1
Date 01/04/2008
DRAWN DKB
Symbiotics LLC

APPENDIX B
Final License Application Exhibit E

EXHIBIT E

ENVIRONMENTAL STUDIES REPORT

E-1. Environmental Report

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1.0 GENERAL DESCRIPTION

1.1 Environmental Setting

Clark Canyon Dam, officially recognized as a flood control and water conservation reservoir, is located in Beaverhead County, Montana, on the Beaverhead River immediately below the junction of Red Rock River and Horse Prairie Creek (Figure 1-1). Benefits of the project are irrigation resources, flood control, fish and wildlife habitat, water supply and recreation. The project is authorized under authority of the Flood Control Act, Public Law 534, 78th Congress, 2d Session, approved December 22, 1944.

The project is administered by the U.S. Bureau of Reclamation’s (Reclamation) East Bench Unit of the Pick-Sloan Missouri Basin Program and provides full irrigation service for up to 28,055 acres with supplemental irrigation service for up to 33,706 acres. Its principal features include Clark Canyon Dam and Reservoir, Barretts Diversion Dam, East Bench Canal, and a system of laterals and drains.

The reservoir has a total capacity of 254,442 acre-feet including an active capacity of 123,009 acre-feet, a joint use capacity of 50,207 acre-feet, and an exclusive flood control capacity of 79,075 acre-feet as well as dead storage and inactive storage capacities. The reservoir surface area is 4,935 acres with 17 miles of shoreline when full (Reclamation website 2004).

The Beaverhead subbasin has a watershed of some 3,619 square miles to include portions of the Ruby, Blacktail, Snowcrest mountain ranges, and the Tendoy Mountains where Horse Prairie Creek originates. In addition, it includes all of the Blacktail Deer creek drainage, and assorted small tributaries draining directly into the river.

As of 2005, flood control management of Clark Canyon Reservoir has resulted in reducing downstream flood damages by approximately $12.5 million. (Reclamation correspondence 2006).

1.2 Geology

Clark Canyon Dam is situated at the conjunction of the northwest-flowing Red Rock River and the east-flowing Horse Prairie Creek which is the originating point of the Beaverhead River. The Beaverhead River is part of the Missouri River headwaters and is within the Montana-Idaho Basin and Range Province (Bartholomew et al. 1999).

Between the Clark Canyon Dam and Barretts Diversion, the Beaverhead River flows through an open valley described as a very straight, deep and narrow defile for the first 12 miles of its course with an average gradient 0.244 percent. It then widens into a broad valley about eight miles south of Dillon, Montana. The steeper gradient within Beaverhead River Canyon may reflect, among other things, Quaternary tectonic controls on the adjacent valleys within this tectonically active region along the perimeter of the track of the so called Yellowstone hotspot (Bartholomew et al. 1999).

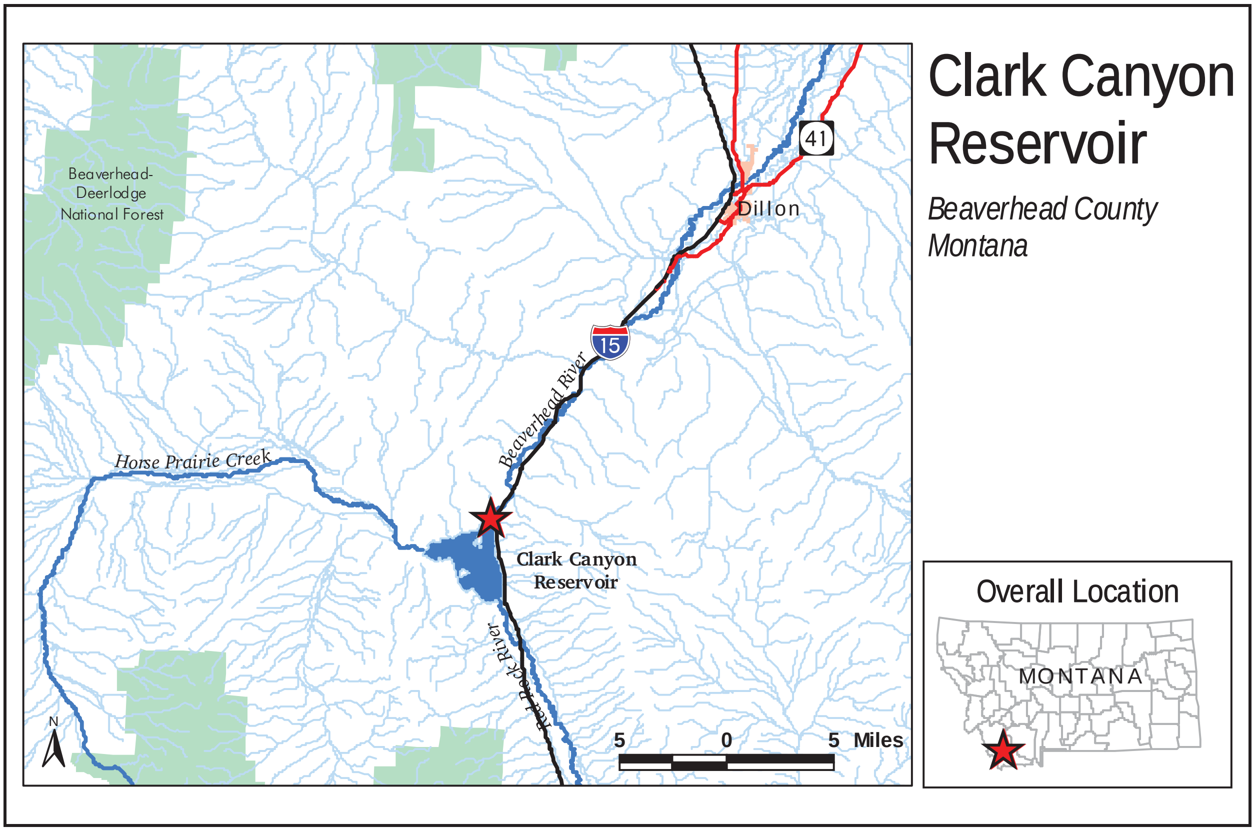


Figure 1-1. A map of the project area.

Data analyzed by Bartholomew et al. (1999) reveals that the course of the Beaverhead River across the Blacktail Range was already established by the Late Pleistocene. Earlier canyon incision of Eocene volcanic rocks presumably formed the bedrock along most of the river's future course. It is unknown when and how this course was established but it is speculated that high volumes of Middle Pleistocene glacial runoff from the continental divide to the south and southwest influenced the general northeast-flow of the ancestral river across the Blacktail Range. Additional evidence suggests that uplifting of the Blacktail Range, relative to the Red Rock River valley as well as the valley encompassing Dillon, must have been substantial in order to achieve the depth of incision across the Blacktail Range without a similar incision across the later Quaternary deposits found in these valleys.

These late Quaternary deposition along the Beaverhead River are believed to have occurred as the river cut through bedrock material which includes: late Paleozoic rocks thrust over late Cretaceous Beaverhead Conglomerate located near Clark Canyon Dam; extensive Tertiary volcanic rocks north of Grasshopper Creek; and Mesozoic and Paleozoic strata exposed beneath the volcanic rocks locally near the river. The sharply dipping Beaverhead Conglomerate flattens abruptly near Henneberry Gulch to make up much of the bedrock near river level. Intrusive volcanic rocks also occur at river level and coarse gravels overlie volcanic rocks along the southeast-side of the river near the mouth of Clark Canyon.

As the river enters the broad basin near Dillon it is nearly perpendicular to the projected trace of the Blacktail fault, the Beaverhead River Canyon was incised across underlying Mesozoic-Cenozoic features after cutting through Eocene volcanic rocks. Stratigraphic, structural and topographic changes at Barretts were noted to partially reflect Neogene movement on the west-northwest-trending Blacktail fault which flanks the Blacktail uplift. The frontal portion the valley is filled with large, late Quaternary, coalescing fan complexes that may be influenced by late Quaternary movement along this active fault.

Late Quaternary landslides abound along the flanks of the lower canyon with larger landslides intruding upon the floodplain which, to a certain extent, deflect the river's course. Active landslides are said to severely restrict the flow on portions of the Beaverhead River. Within Beaverhead Canyon, landslide events have blocked and diverted the river and there is speculation that there may have been some correlations to major earthquakes like the Quake Lake slide associated with the August 17, 1959 Hebgen Lake earthquake.

In regional terms, the lithology and stratigraphy composition said to be complex with Precambrian granitic, Paleozoic metamorphic, and Tertiary sedimentary and volcanic rocks.

Soils within the Province consist of frigid and cryic Ochrepts, Boralfs, and Borolls, with some Fluvents and Aquepts in alluvial valleys. Mountain soils are known to be comparatively shallow to moderately deep with loamy to sandy textures and punctuated by rock fragments. Valley soils are moderately deep to deep with loamy to clayey textures (Bailey 1995).

The U.S. Forest Service (USFS), in Watershed And Stream Conditions in the Gravelly Landscape, from the Gravelly Landscape Analysis Documentation 9/14/99 report has characterized five Ecological Landscape Units (ELU). One of which, the Low Elevation Valley

Bottom - Bearerhead/Ruby ELU, is described as forming the western and northwestern portions of the Gravelly Landscape which includes the Lower Red Rock, Beaverhead, and Ruby river valleys. Elevations in this unit range from 4,630- to 6,260-feet. Geologically, the unit is characterized as valley habitat filled with deep Quanternary alluvium and Tertiary deposits of consolidated and unconsolidated sandstones, shales and conglomerates. The report states that recent faulting has resulted in active stream down-cutting.

In 2000,Reclamation executed a study to calculate reservoir capacity lost due to sediment accumulation since 1964 which may be associated with stream down-cutting. Since the dam's closure in 1964, the reservoir has accumulated a sediment volume of 4,160 acre-feet below 5,546.10 elevation which amounts to 2.3 percent loss in capacity and an average loss of 114.7 acre-feet annually.

1.3 Climate

The Beaverhead subbasin is part of the Red Rock Hydrologic Unit located on the eastern edge of the Continental Divide and exhibits the semi-arid climate indicative of continental basin-and-range type mountains and intermontane valleys.

On average, the bulk of the region's precipitation occurs in the months of March through July and September. Precipitation, mostly in the form of snowfall, is generated from the moist air masses of the west coast's mid-latitudes and driven by strong westerly to southwesterly winds over the mountainous Continental Divide (Caprio and Nielson 1992). The average seasonal snowfall is notably dependent on elevation. At Dillon, for example, the yearly average is around 35 inches, but at just slightly higher elevations the annual average is up to 70 inches per year. On average, about 50 days per year have at least 1 inch of snow on the ground at Dillon, but higher elevations have snow for upwards of 100 days annually. At Dillon, the average annual precipitation is 11.67 inches.

Winter temperatures at Dillon average about 25.6˚F with a winter average daily minimum temperature 14.6˚F. The lowest temperature on record at the Dillon station was 40 below zero on February 9, 1933. Summer temperatures average about 63.0˚F at Dillon with the average daily maximum summer temperature at 80.5˚F. The highest temperature ever recorded at Dillon was 100 on August 12, 1940 (NRCS 2004).

Average annual total precipitation across the survey area is highly dependent on location and elevation. Driest areas are in the northern valley section north of Dillon where between 9 and 10 inches of precipitation falls in a typical year. The southeast part of the survey area, and the westernmost section at highest elevations, receive the most precipitation annually. Some areas receive up to 20 inches, with 15 to 18 inches common along the southern and southeast border. At Dillon, the average annual precipitation is 11.67 inches. Of this amount, about 5.3 inches, or 46 percent, usually falls in June through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record at Dillon was 1.94 inches at Dillon on May 28, 1982. Thunderstorms occur on about 25 days each year, and most occur between June and August (NRCS 2004).

The average frost-free period for Dillon is 99 days. Regionally, the growing season ranges from 45 to 100 days. Data from The Western Regional Climate Center at the Dillon City Airport indicate temperature variances from a December low of -37˚F to an August/July high of about 100˚F (WRCC 2004). The region's semi-arid conditions dictate low soil-moisture content that is insufficient for tree growth below timberline on some south and west landscape aspects and, as such, grasslands can extend from valley bottoms to the neighboring mountaintops.

The average relative humidity in mid-afternoon is about 30 percent in summer and about 70 percent in winter. Humidity is higher at night with the average at dawn at about 80 percent in most months. The sun shines about 72 percent of the time in summer and about 40 percent in winter. The prevailing wind is highly dependent on terrain, but generally follows the valleys, with south winds for much of the year in the main valley, but also from the north a good percentage of the time. Average wind speed is highest, around 9 miles per hour, in April and May (NRCS 2004).

1.4 Natural Resources

Vegetation is dominated by Grassland/Sagebrush-Grass Steppe cover type. Steppe species common to the area include big sagebrush, fescues, wheatgrasses, and needlegrass. Beaverhead basin does hold a small percentage of forest lands with Douglas-fir, limber pine, and lodgepole pine among the common tree species. The majority of the land is privately owned with extensive coverage of agricultural and urban lands with ranching recognized as the dominate use of the land. Irrigation service from Clark Canyon Dam and Barretts Diversion is supplied to 21,800 acres with supplemental irrigation service to 28,000 acres cultivated for grains, potatoes, alfalfa and forage crops.

Birds known to populate the area include significant number of species typical of the Great Plains. Species of note are trumpeter swan, Barrow's goldeneye, Swainson's hawk, golden eagle, sage grouse, sandhill crane, American dipper, Townsend's solitaire, and Brewer's sparrow. Birds nearing the edge of their range are spruce grouse, black-throated hummingbird, pileated woodpecker, eastern kingbird, red-eyed vireo, and northern water thrush. Typical herbivores and carnivores include white-tailed deer, mule deer, pronghorn, elk, moose, black bear, bobcat, and cougar. Smaller common herbivores include the snowshoe hare and northern flying squirrel. Rare species include the gray wolf, lynx, wolverine, pygmy rabbit, Great Basin pocket mouse, and the northern bog lemming. Herpetofauna typical of this area are the spotted frog, wood frog, Pacific treefrog, boreal toad, western toad, and long-toed salamander.

The region encompassing southwest Montana is said to contain the most extensive mineral resources of any area in Montana. Unique geologic structures and mineralogy of the region offer commercial grade to potentially commercially grade deposits of the following: precious metals such as gold and silver; industrial minerals including talc, chlorite, phosphate, limestone, zeolite, garnets, vermiculite, sand, gravel, building stone, and the rare earth commodities of thorium and uranium; and energy mineral such as oil, gas, oil shale and coal (USFS).

1.5 Population, Economy and Employment

According to 2000 Census records, Beaverhead County is populated by about 9,000 people with Dillon the county seat and largest community, at about 4,000 people. The Beaverhead Chamber of Commerce lists the county's major industries as agriculture, minerals, education, retail, tourism and government. Census 2000 statistics indicates that by industry, "education, health, and social services" employees 26 percent of the labor force with "agriculture, forestry, hunting and fishing, and minerals" employing 19.3 percent and "arts, entertainment, recreation, accommodation and food services" rounding out the top three employers at 10.3 percent of the work force. The median household income in the county is $28,962, with the median family income at $38,971 and per capita income at $15,621. As of the 2000 Census, there is a 2.4 percent unemployment rate for the county. According to the Montana Research and Analysis Bureau, unemployment in the county was 4 percent in 2000 and 4.9 percent in 1999. Almost 13 percent of the county's family units are living below poverty levels (CENSUS 2000).

Clark Canyon Reservoir provides water for the East Bench Irrigation project east of Dillon, Montana. The project's stored water capacity provides irrigation benefits by an increase in net farm income. Beaverhead County's agriculture industry produces cattle, sheep, horses, hay, grain, seed potatoes, canola, and waxy barley with cattle and livestock ranching the predominant agricultural ventures of the region. According to the Montana Agricultural Statistics Service, the county is the top producer of beef cattle and "all hay" acres harvested, third in potato production and fourth in all sheep and lambs production in 2003 (MASS 2003). Agriculture is Montana's number one industry.

2.0 WATER USE AND WATER QUALITY

2.1 Hydrology

Flows for the Beaverhead River leaving Clark Canyon Reservoir from 1965 to 2003 can be seen in Figure 2-1. The data were obtained from Reclamation's Hydromet web site for Clark Canyon Reservoir (http://www.usbr.gov/gp/hydromet_arcread.htm). The overall average flow for the period of record used in this analysis (1965-2003) was found to be 375 cfs with a minimum flow of 23 cfs and a maximum flow of 2,586 cfs. Using these data, a flow exceedence curve was constructed and is shown in Figure 2-2. The data indicates that the 80 percent exceedence flow is 100 cfs and the 20 percent exceedence flow is 650 cfs. The 50 percent exceedence flow is 280 cfs.

Extended periods of low flows (<100 cfs) have occurred in 1967, 1975, 1986, 1990-93, and 2001-2004. The last dates have reduced the reservoir storage to its lowest level since construction. Conversely, there have also been extended periods of above average precipitation. These years (1976, 1984, 1996 and 1999) resulted in high discharges from the reservoir. In 1984, spring snow melt, accompanied by spring rains, contributed to a maximum combined release of 2,586 cfs through the river outlet works and spillway. The cyclical pattern described above can best be visualized by inspecting the annual water yield from the reservoir. These data can be seen in Figure 2-3.

In order to define a typical annual hydrograph for flows leaving the Clark Canyon Reservoir, an annual hydrograph was developed for the daily discharges. Figure 2-4 describes the daily minimum, maximum and average observed flows from the reservoir between 1965 and 2003. The data indicates four distinct hydrologic time periods. Starting in April, water releases from the reservoir are increased, ramping to a stabilized level of 750 cfs (average). This corresponds to a reservoir filling period. The second period is a 45 day (June 1 to July 15) period of stabilized flows of approximately 750 cfs. This corresponds to a near full pool in the reservoir. The third hydrologic period is from approximately July 15 to the end of August and is represented by elevated and changing flow (reaching a maximum average daily discharge of 880 cfs). These flows correspond to a reduction in reservoir storage. Flows continue to drop until the end of September. The final hydrologic period is the low stable flow from October to the following April. This period corresponds to the reduced reservoir storage.

The hydrology of Clark Canyon Reservoir is defined by its intended use as an irrigation enhancement and flood control facility. Inspection of Figure 2-5 shows the daily storage in Clark Canyon Reservoir from 1965 through 2004. Using this database in its entirety, the average daily storage for this 39-year period of record was 132,940 acre-feet with a minimum of 10,720 acre-feet and a maximum of 283,070 acre-feet. The minimum occurred in 2003 and the maximum in 1984. In order to infer a typical annual operational cycle, the average, minimum and maximum daily storage volumes were calculated for the time period 1965 through 2003. These data are shown for reservoir storage as well as reservoir elevation (Figures 2-6 and 2-7). The operation of Clark Canyon Reservoir can be defined by the adage "fill and spill." Inspection of Figures 2-6 and 2-7 demonstrates this principle. Using the average daily data, the lowest

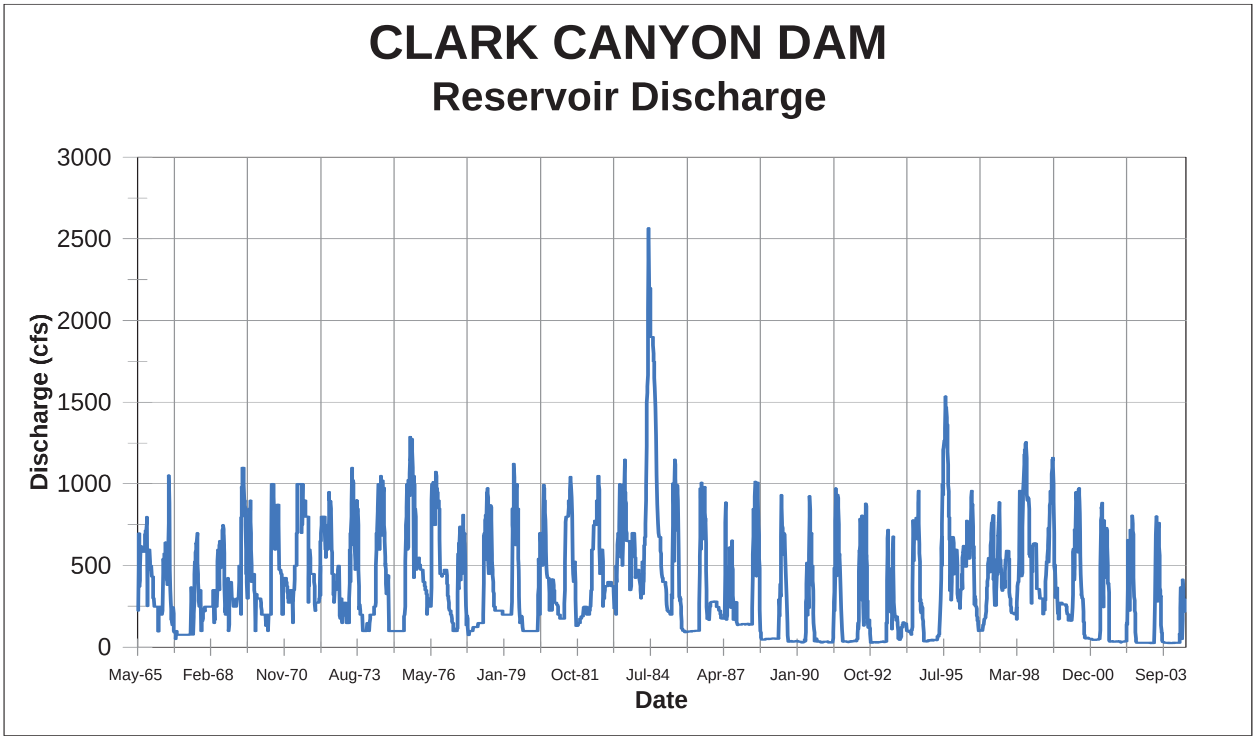


Figure 2-1. Flows for the Beaverhead River below Clark Canyon Dam (1965 to 2003).

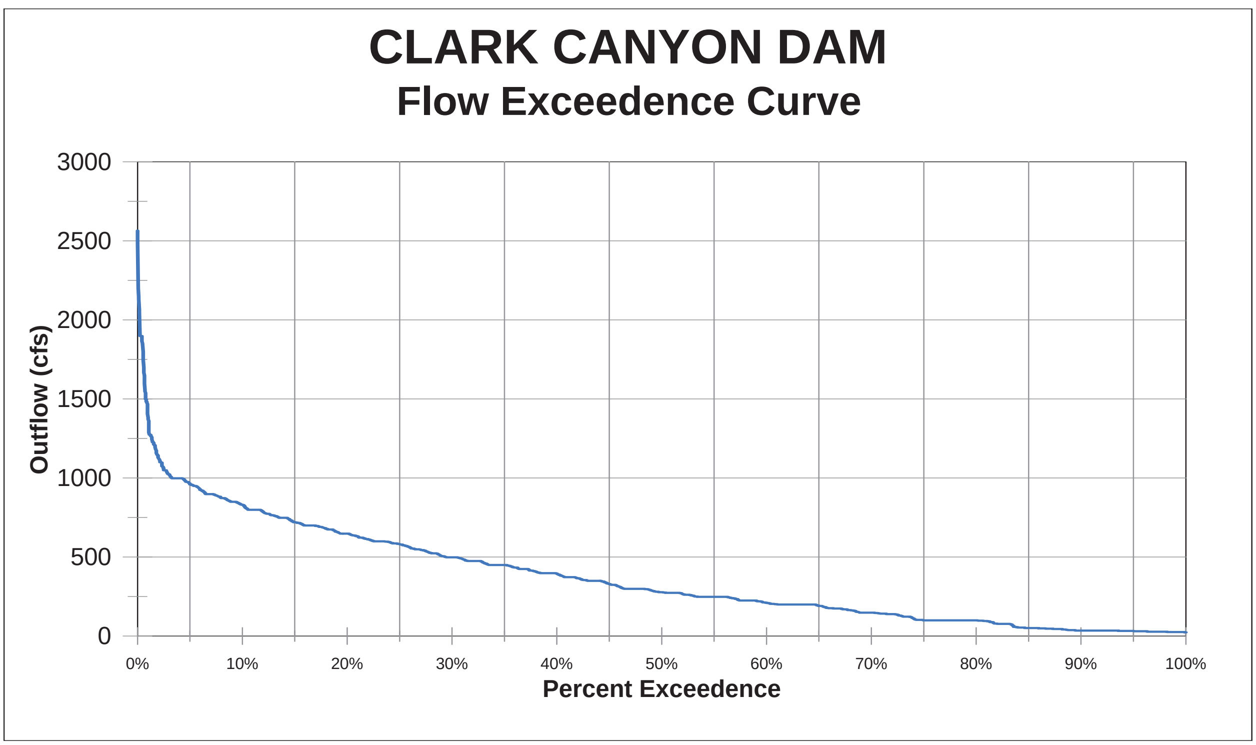


Figure 2-2. An exceedence curve for the Beaverhead River below Clark Canyon Dam.

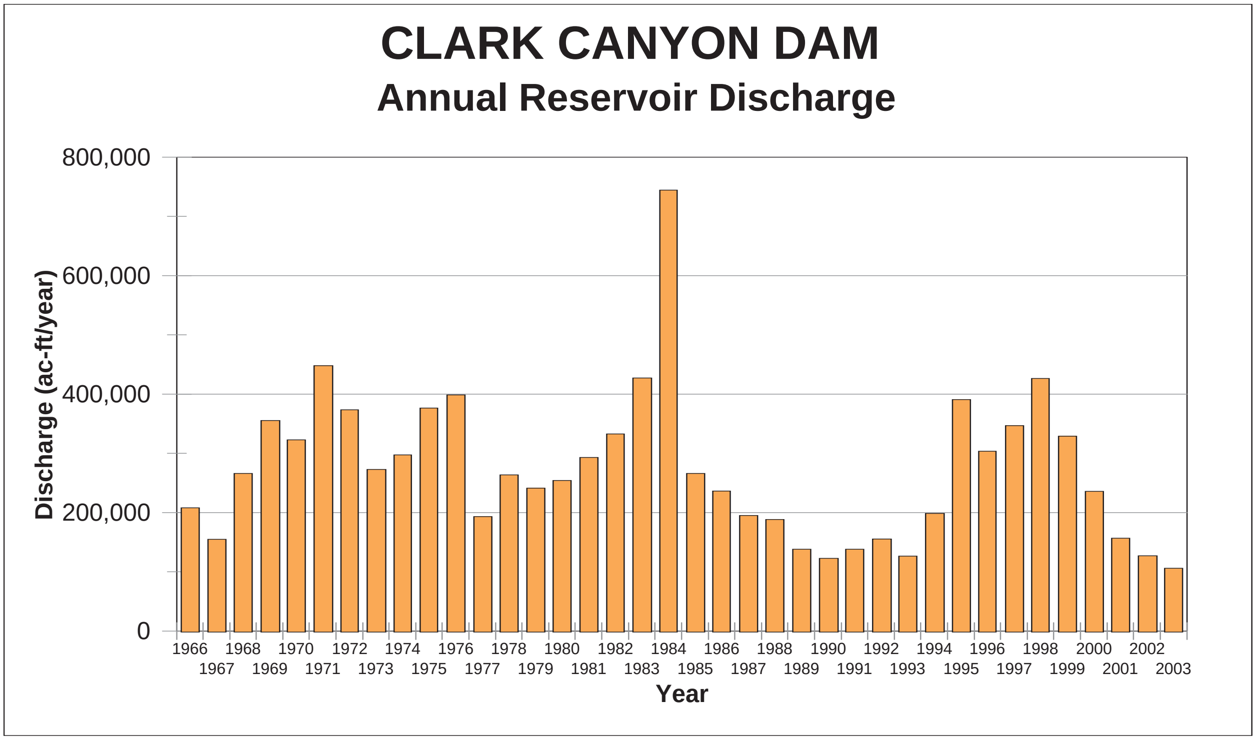


Figure 2-3. Annual water yield of Clark Canyon Reservoir.

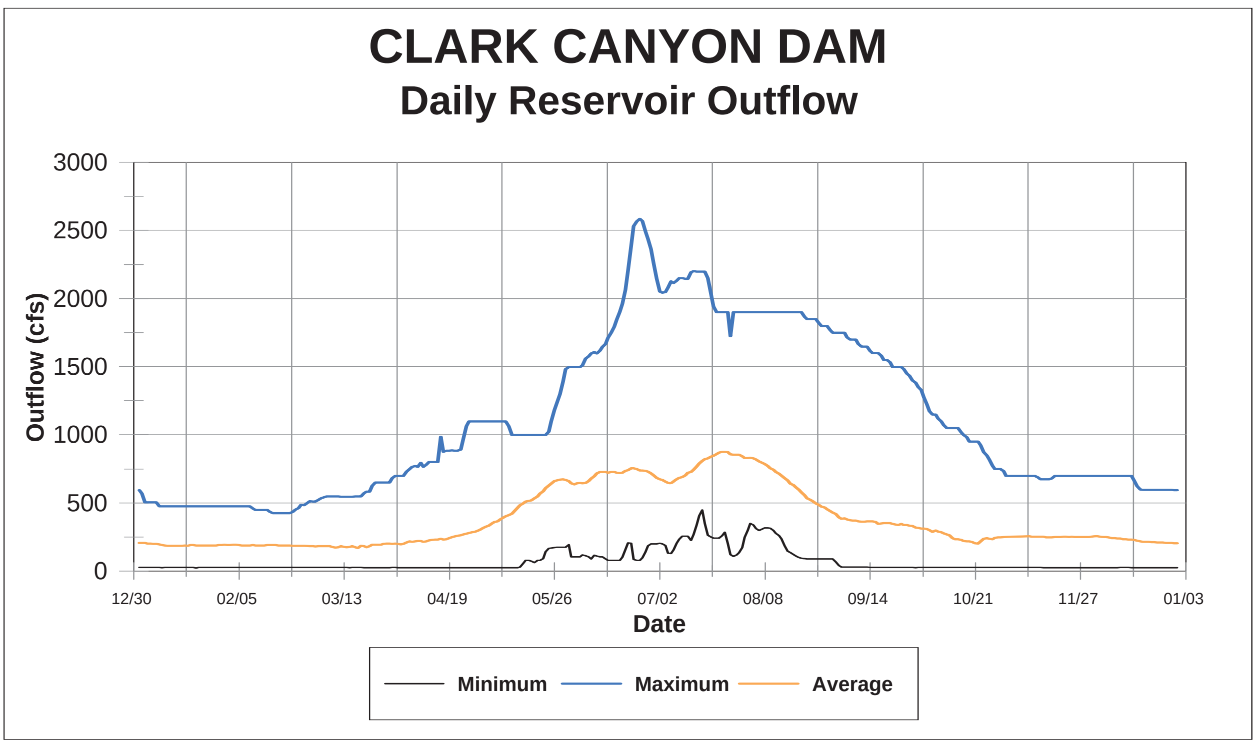


Figure 2-4. The daily minimum, maximum and average observed flows from the reservoir between 1965 and 2003.

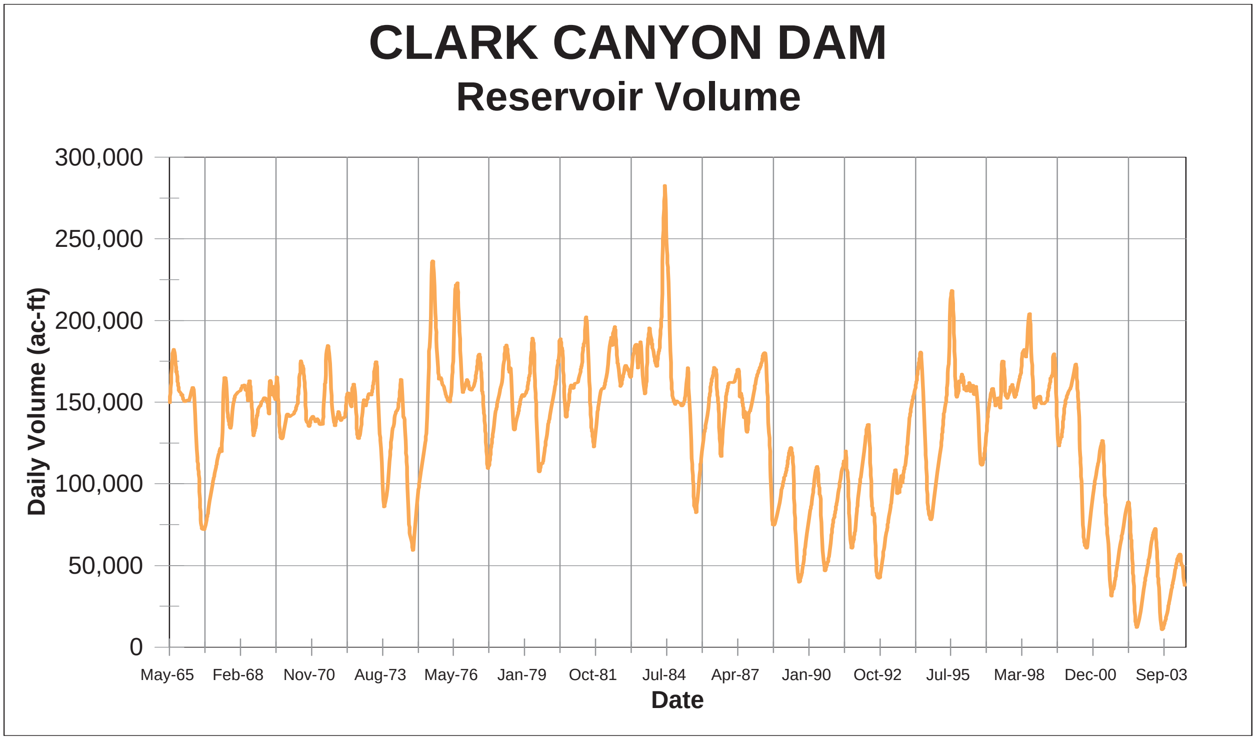


Figure 2-5. Daily storage in acre-feet for Clark Canyon Reservoir.

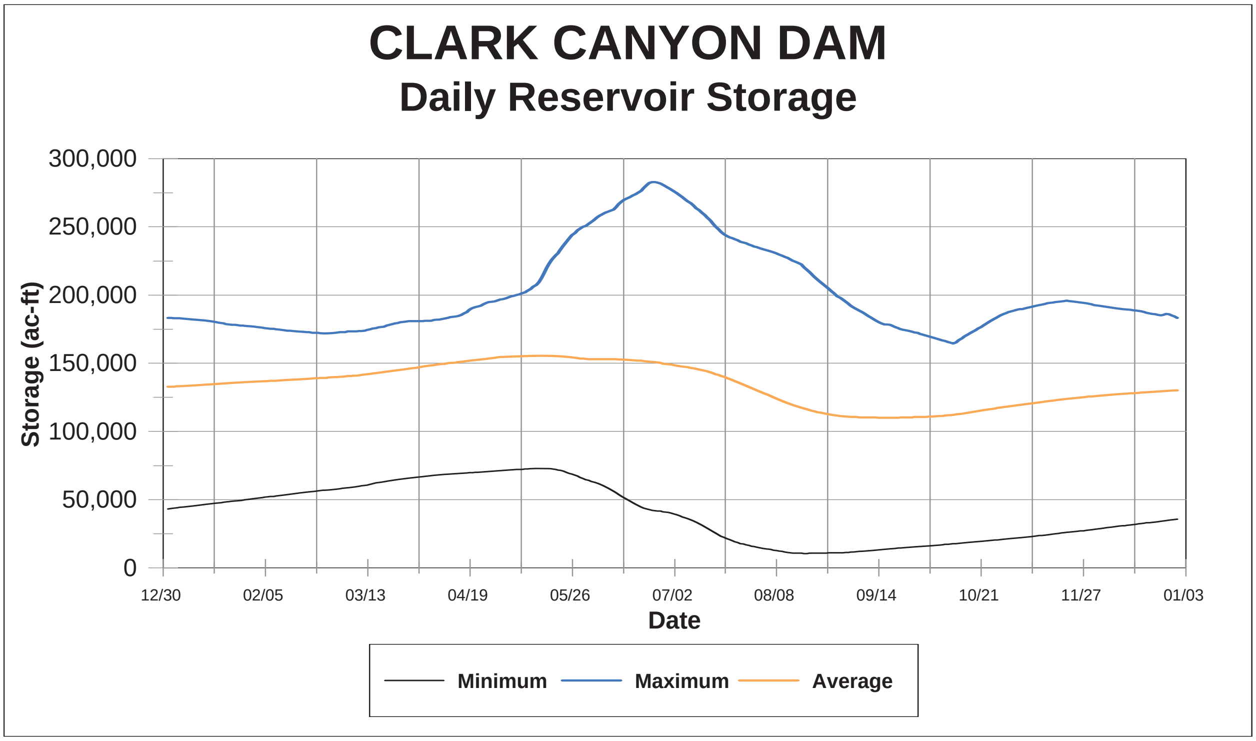


Figure 2-6. Average, minimum and maximum storage for Clark Canyon Reservoir.

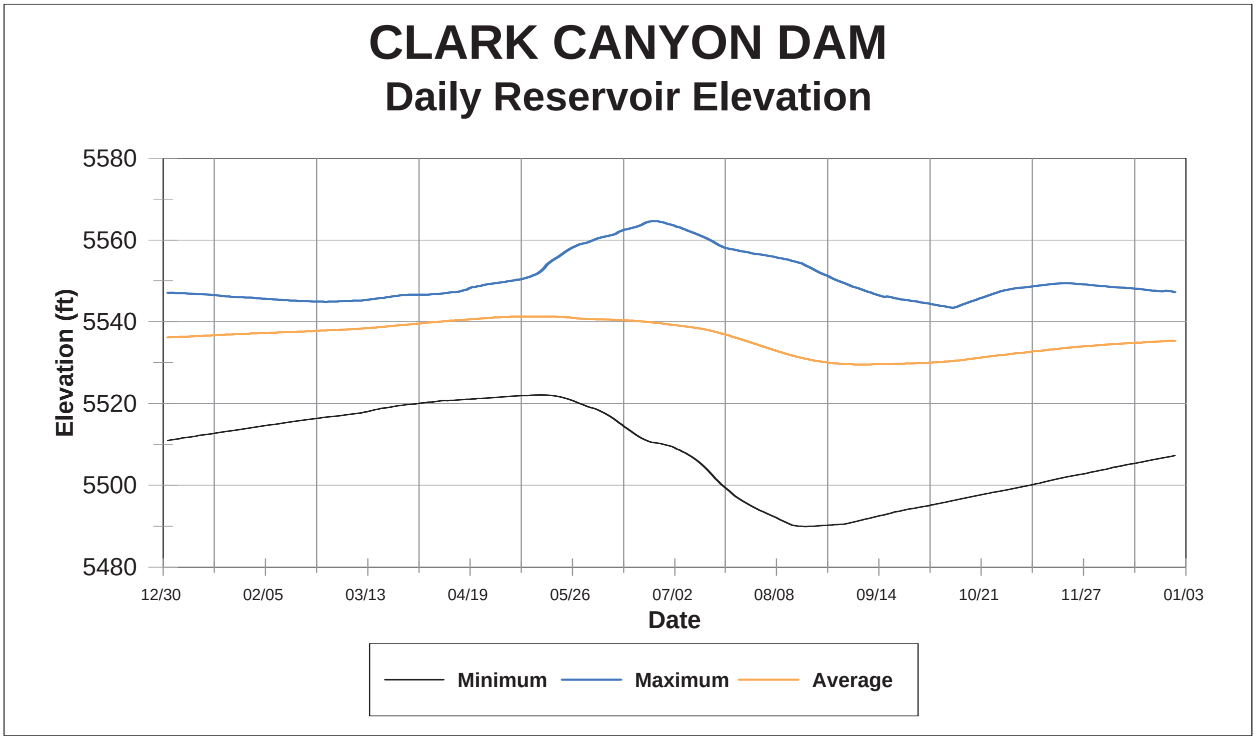


Figure 2-7. Average, minimum and maximum elevation for Clark Canyon Reservoir.

reservoir elevation corresponds to the end of the irrigation season (end of September). From this point on, the reservoir elevations and storage volumes steadily increase until maximums are attained. This occurs, on average, by the middle of May. It is interesting to note that the extreme conditions (minimum and maximum curves) when graphed on an annual basis both have large extremes (i.e., highest and lowest elevations for a given condition) compared to the average hypothetical year. For the average condition, the difference between the annual high and low elevation is only 13 feet, while the maximum condition is 21 feet and the minimum condition is 32 feet of difference.

2.2 Water Quality

Since being constructed, several water quality investigations have been conducted on Clark Canyon Reservoir and the Beaverhead River immediately below the reservoir. During 1971-1972, Smith (1973) conducted limnological studies on the effects of Clark Canyon Reservoir on the water quality of the outflowing Beaverhead River. His data indicated that the reservoir has moderated the summer and winter temperatures of the Beaverhead River (as compared to Red Rock River and Horse Prairie Creek). In addition, summer and winter diel (daily) temperature variations immediately below the reservoir were also found to be reduced. For example, Smith observed summer diel temperature variations upstream of the reservoir to range from 13˚C to 21˚C, while below the dam, the Beaverhead was a constant 15˚C.

Nutrient data collected immediately below the reservoir indicated total inorganic nitrogen (ammonia+nitrate+nitrite) concentrations ranged between 20 and 300 μg N/l, with an average of 150 μg N/l. During the same time period (summer 1972), orthophosphate ranged between 40 and 180 μg P/l, with an average of 110 μg P/l. These nutrient data indicate that there are soluble nutrients being exported from the reservoir and that these nutrients are available for algal growth downstream from the reservoir. Using the N/P ratio, the data indicates that nitrogen will limit primary production downstream from the dam.

A study conducted in 1971-1972 (Berg 1974), looked at primary and secondary production within Clark Canyon Reservoir. Data collected from 1971 to 1972 was compared to data collected in 2004 by Ecosystems Research Institute to look at the effect of low water levels within the reservoir. Temperature and dissolved oxygen data was used as a basis for this analysis. In August 2003, Clark Canyon Reservoir hit an historic elevation low of 5,490 msl, which left 10,271 acre-feet of water impounded by the dam. Data collected in July of 1971 and 1972 showed reservoir elevations of 5,547.2 and 5,542.8, respectively, with an active storage of 171,929 acre-feet and 161,486 acre-feet. Data collected in July 2004 had a elevation of 5,507.6, or 36,650 acre-feet of water.

Temperature and dissolved oxygen are two factors that greatly affect fresh water biota within a lake system as well as key indicators to other biological factors within a reservoir. Temperature profiles taken near the dam show a similar temperature regime, although in 2004 the thermocline begins at a depth of 10 meters instead of the 20 meters shown in 1972 (Figure 2-8). The data also indicates the reservoir is well-stratified in July and pushed to its maximum depth in the late summer months. Surface temperatures can fluctuate dramatically from late cold spells (Berg 1974).

Based upon data collected as part of the License Application, dissolved oxygen within Clark Canyon Reservoir compared to the 1971-1972 data shows a presence of strong clinograde during the July sampling periods (Figure 2-9). Concentrations between all sampling periods indicate that reservoir elevation shows no effect on dissolved oxygen during the July months. Current data, as well as historical data are almost identical. It is inferred that reservoir conditions have not changed in approximately 30 years relative to oxygen depletion. Low dissolved oxygen concentrations in the bottom of the reservoir were observed during all sampling periods. Berg recorded concentrations of total inorganic nitrogen and phosphorous in at the bottom depths during July 1972 to be 310 µg/l and 200 µg/l, respectively. This data would indicate that the reservoir may be nitrogen-limited and experience blue-green algae blooms late in the summer, depleting oxygen concentrations near the bottom. Current water quality data are being collected by Reclamation, but were not available in time for this Final License Application. When available, it will be submitted to the FERC.

During 1983, gas bubble disease was observed for the first time in trout in the Beaverhead River below Clark Canyon Dam. This corresponded to a time when the reservoir was at its maximum capacity and under both outlet and spill conditions. Data showed that 8.8 percent of the brown trout and 3 percent of the rainbow trout sampled immediately below the dam exhibited disease symptoms (Oswald 1985). The reservoir spilling for the first (and only) time since its construction was considered by some water quality experts to be the cause of the supersaturation. However, data collected by Falter and Bennett (1987) during a non-spill period also found elevated levels of gases in the water. The highest levels observed for the non-spill time period was 126 percent compared to 127 percent during spilling (Figure 2-10). Lowest levels were always above 100 percent of saturation. Using all available data, a flow/gas saturation envelope curve has been constructed for the outflow water at Clark Canyon Dam (Figure 2-8). The data would indicate that a strong linear relationship between flow and total gas pressure exists between 0 and 1,000 cfs. This is the normal annual range of outflowing water from the reservoir. This analysis supports the conclusions drawn by Falter and Bennett that the design of the outlet structure is the cause of gas supersaturation problems observed in the river below Clark Canyon Reservoir. The placement of a hydroelectric project on the outlet structure will reduce or eliminate this problem by reducing the turbulent mixing in the tailwater pool.

2.3 Water Quality Impacts

The project as designed and operated (run-of-river) will not change the long term water quality in the Beaverhead River. Because the project will use the existing outlet structure, the exporting temperature, and dissolved or particulate materials will not change with the project in place. We have proposed an extensive soil erosion control program which will mitigate any short term construction related impacts.

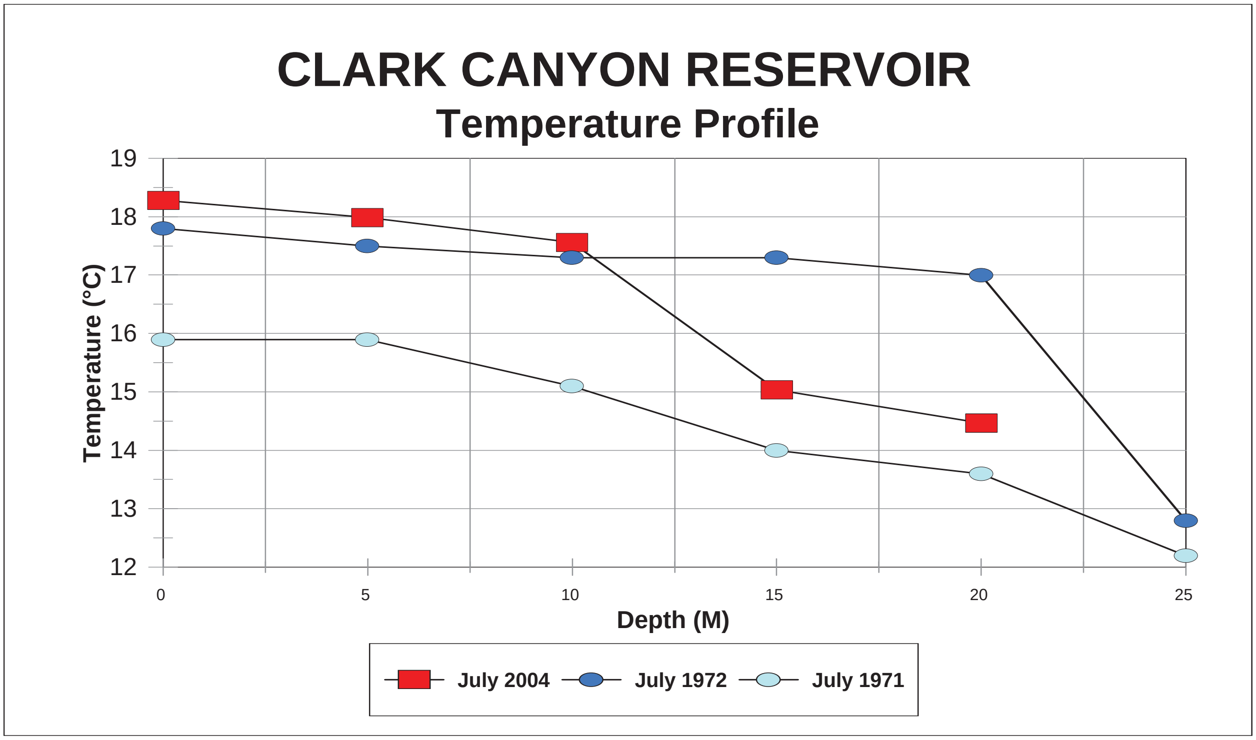


Figure 2-8. A comparison of temperature profiles in Clark Canyon Reservoir.

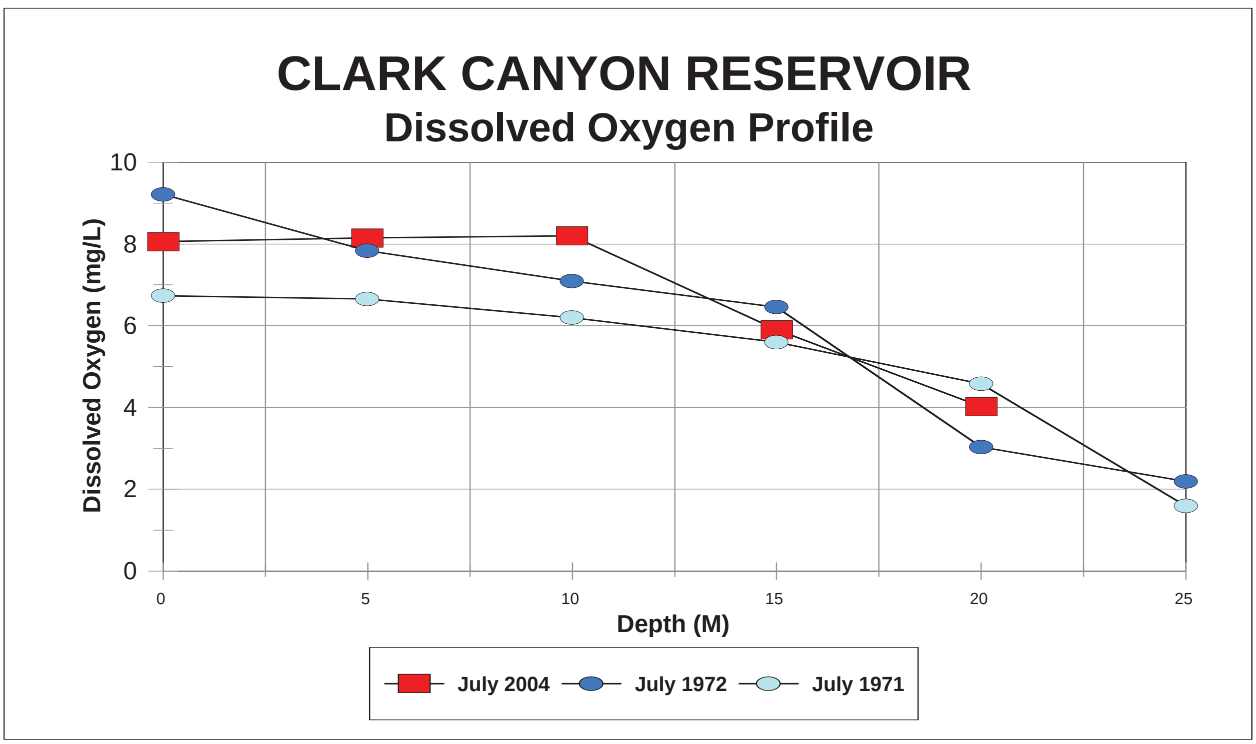


Figure 2-9. A comparison of dissolved oxygen profiles in Clark Canyon Reservoir.

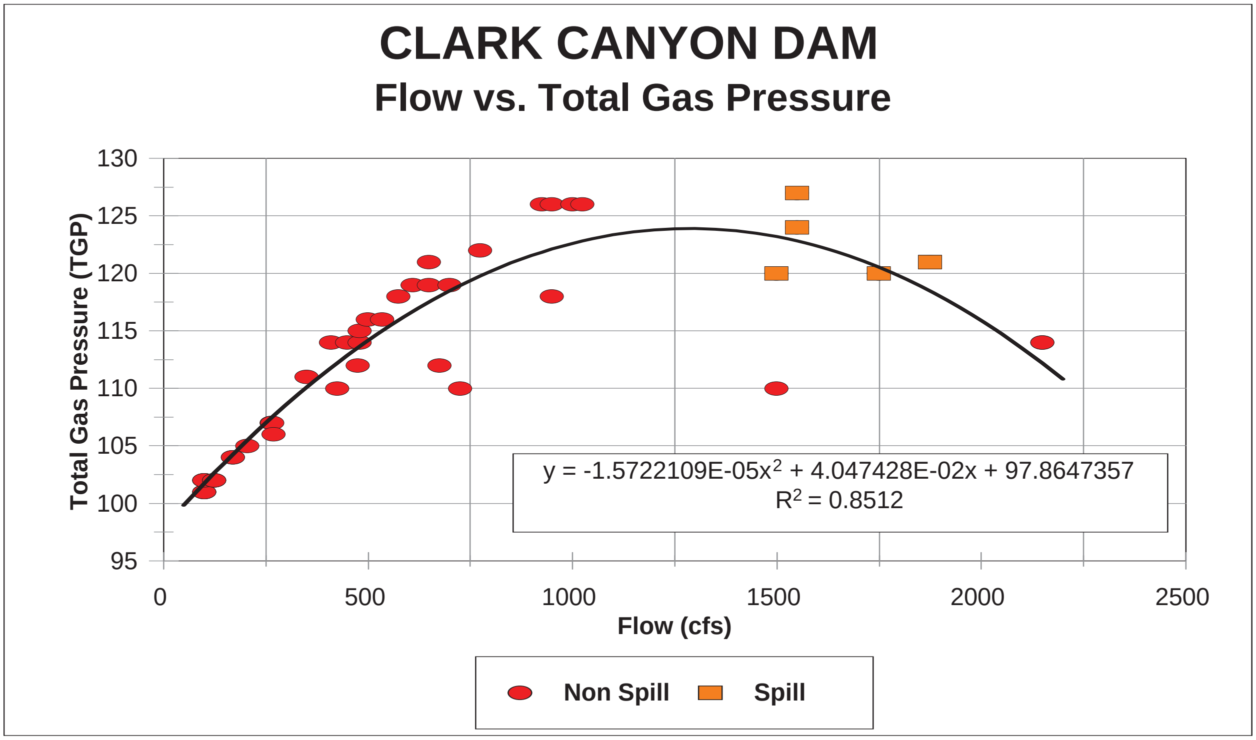


Figure 2-10. The relationship between outflow and total gas pressure (TGP) in the Beaverhead River immediately below Clark Canyon Dam (Falter and Bennett 1987).

It is anticipated that there will be no long-term impacts to the existing water quality conditions in the Beaverhead River or in Clark Canyon Reservoir. In fact, as previously stated, the currently existing problem of total dissolved gas saturation will be reduced or even eliminated by the placement of a hydroelectric project on the outlet structure which would reduce the turbulent mixing in the tailwater pool. The project will operate in a run-of-river mode, there will be no changes due to operations of the hydroelectric facilities.

2.4 Minimum Flow

In as much as the proposed project will be operated as run-of-river, the Applicant intends to utilize established flow regimes that provide a balance between the watershed's environmental, recreational and agricultural demands.

2.5 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. Comments relative to water quality resources were received from the Montana Department of Environmental Quality and Montana resident, Curtis Kruer. In summary, only synoptic water quality data were collected as part if this License Application. Several studies were ongoing (a TMDL investigation and a Reclamation Resource Management Plan), and it was felt that additional studies would be redundant.

The comments from the Montana Department of Environmental Quality (MDEQ) were both specific and general. An initial statement qualified their position as one dictated by a "delegated responsibility to certify under §401 of the federal Clean Water Act that any federal license or permit for an activity that may result in a discharge into states waters will meet applicable state water quality standards." The letter also stated the Administrative Rules of Montana 17.30.101 et Seq. describe MDEQ procedures and information requirements of the Applicant.

The letter next directed attention to the department's requirement that receipt of the required fee is requisite before they can determine if a §401 application is complete. Specific comments first requested a change in word choice from "Total Mass Daily Loading" to "Total Maximum Daily Load."

The letter next stated re: Section 4.4.2 Aquatic Resources: Proposed Study, that the Applicant should conduct sampling and studies as proposed with DEQ-recommended modifications/additions. The letter next stated re: Section 5.3.1 Water Quality Resources: Proposed Study, that the Applicant should conduct sampling in the Beaverhead River.

The last comment "strongly recommends" a study to describe Total Dissolved Gas (TDG) levels above and below the dam and the dissipation or persistence of TDG in the Beaverhead River as well as a description of any present design considerations or modifications of the proposed project that will ensure the established TDG standard will be met.

Curtis Kruer of Sheridan, Montana, submitted a letter suggesting that the Phase I and Phase II reports on the state's Total Maximum Daily Load assessment of the Beaverhead Watershed be included in any subsequent reports regarding the proposed project.

2.6 Applicant Recommendations

On the initial statement, the Applicant is mindful of the Clean Water Act §401 regulations and is prepared to work in close coordination with MDEQ staff to ensure all department requirements are met in a timely manner.

With regard to the first specific statement, The Applicant has made the necessary change in the document to reflect the MDEQ request.

With regard to the proposed study on Aquatic Resources, the Applicant concurs and will fully cooperate with agency staff. However, based upon the historical water quality data and the previous FERC license at this site, no studies are contemplated prior to the start of construction. Studies which were originally discussed were redundant with respect to what is known about the Beaverhead River and the current TMDL studies being done in the drainage. However, the applicant does propose to monitor water quality conditions (turbidity, temperature and TGP) during the initial operation of the project. With regard to this proposed study on water quality, the Applicant will fully cooperate with agency staff to ensure the study's planning and implementation reflects MDEQ concerns and guidance.

With regard to the proposed study to describe Total Dissolved Gas levels above and below the dam, the Applicant concurs and will fully cooperate with agency staff to ensure the study's planning and implementation reflects MDEQ concerns and guidance. As noted above, the applicant is proposing a post construction TGP monitoring as part of its water quality mitigation plan. In addition, we propose to start the temperature and TGP monitoring prior to and during construction.

With regard to Mr Kruer, the Applicant is aware of the ongoing efforts of the MDEQ TMDL process and agrees with Mr. Kruer. The Applicant will comply with his suggestion. According to the published MDEQ TMDL reports, the Beaverhead Watershed's report is scheduled to be released in 2008. The Applicant will include any pertinent documents in subsequent license application reports as applicable and available.

In June of 1988, the Federal Energy Regulatory Commission (FERC) granted an "Order Issuing License" to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a "Finding Of No Significant Impact." The project described within this Draft License Application is the same as that previously proposed which resulted in a "no significant impact" determination. Furthermore, there has been no significant changes in water quality of the reservoir source of the river in the interim period (Smith, 1973).

Within the "Order Issuing License" document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures (specifically Article 401 and 402) and supports the premiss behind the Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project.

2.7 Final Agency Consultation and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

3.0 AQUATIC, WILDLIFE, AND BOTANICAL RESOURCES

3.1 Aquatic Resources

This section describes fisheries resources within the project vicinity (approximately 10 miles from project features) including Clark Canyon Reservoir, the Beaverhead River from Clark Canyon Dam (RM 74.9) downstream to Grasshopper Creek (RM 63.1), and other major tributaries to the Beaverhead within that area (Figure 3-1). A review of existing aquatic resources data indicates significant amounts of work have been completed in the project area relative to defining existing conditions.

The Beaverhead River below Clark Canyon Dam to Dillon (approximately 20 miles) is characterized by a constricted, meandering channel lined with dense stands of native willow, cottonwood, and other riparian vegetation. Montana Department of Fish, Wildlife and Parks (MFWP) has designated the Beaverhead River a Class I Blue Ribbon Fishery (MFWP 2000) and it is recognized as one of the most popular and productive trout fisheries in North America. Rainbow and particularly brown trout can attain trophy size in the river (MFWP 2000).

The Beaverhead River flows northward for about 75 miles below Clark Canyon Dam before merging with the Big Hole River at Twin Bridges, Montana, to form the Jefferson River. The Jefferson River eventually merges with the Madison and Gallatin Rivers at Three Forks, Montana, about 100 miles downstream of Clark Canyon Dam, to form the Missouri River (FERC 1988a).

3.1.1 Fish Community

Native fish species found in the project vicinity which encompasses the area extending to approximately 10 miles out from project features, include westslope cutthroat trout (*Oncorhynchus clarki lewisi*), mountain whitefish (*Prosopium williamsoni*), burbot (*Lota lota*), longnose dace (*Rhynichthys cataractai*), mottled sculpin (*Cottus bairdi*), mountain sucker (*Catostomus platyrhynchus*), longnose sucker (*C. catostomus*), and white sucker *(C. commersoni*). Introduced species include rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), redside shiner (*Richardsonius balteatus*) and common carp (*Cyprinus carpio*) (MFWP 2004a).

3.1.2 Threatened and Endangered Species

No endangered or threatened aquatic species are know to occur in the project vicinity. However, westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and Montana Arctic grayling (*Thymallus arcticus montanus*) have been considered for listing in the past and either may occur in the project vicinity or have the potential to occur in the future. For those reasons, a brief analysis of the status and distribution of these species is warranted.

3.1.2.1 Westslope Cutthroat Trout

The westslope cutthroat trout is a subspecies that occurred historically throughout the Northern Rocky Mountain states, including the Beaverhead River Basin. It is distinguished from

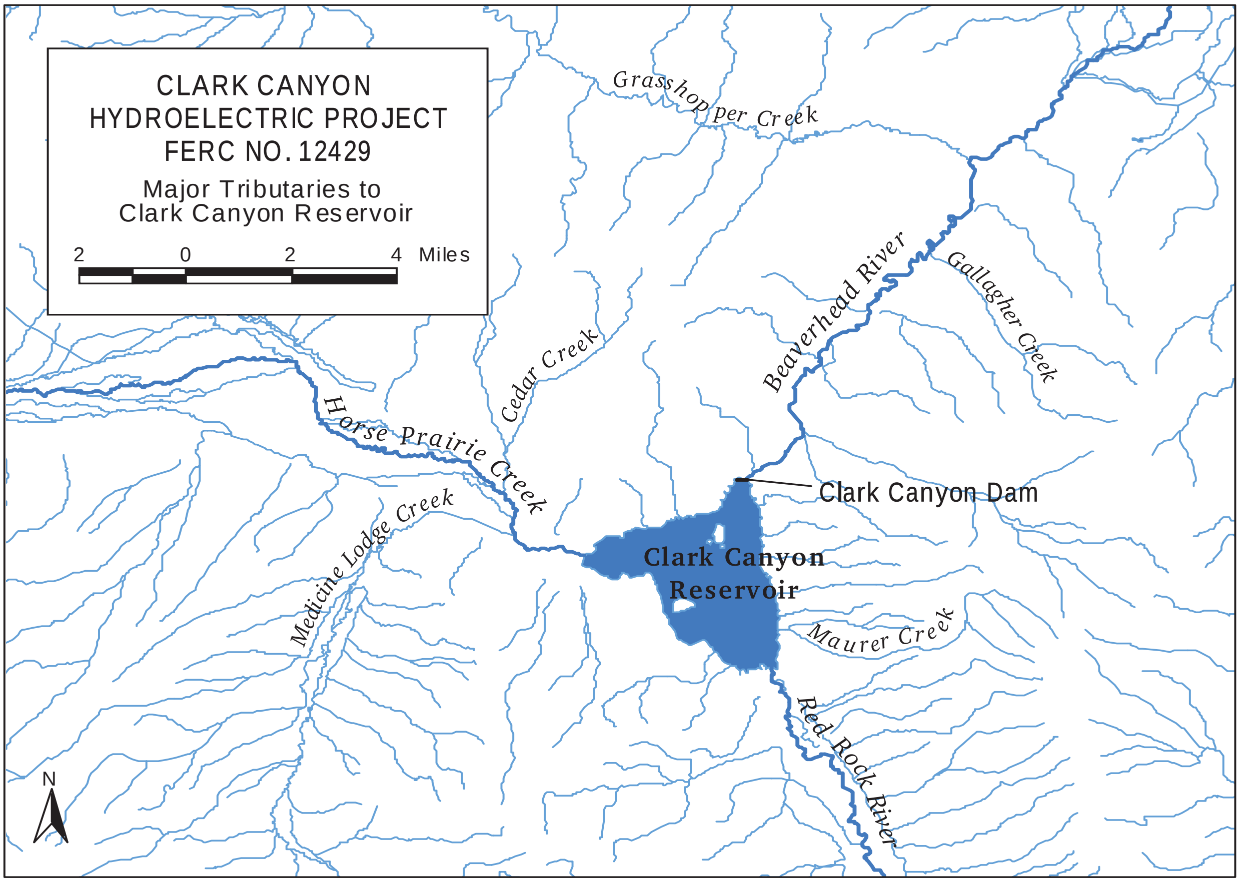


Figure 3-1. Map of project vicinity including Clark Canyon Reservoir, Beaverhead River to Grasshopper Creek, and major tributaries.

other subspecies of cutthroat trout by a pattern of irregularly shaped black spots on the body which are concentrated near the tail, but are relatively sparse on the anterior region of the fish below the lateral line (Photo 3-1). Pure and nearly pure populations (MFWP 2005) have been documented in portions of the Beaverhead River drainage (MFWP 2005) in recent years (Shepard et al. 2003) and some individuals may occur in the project vicinity.

Abundance of westslope cutthroat trout in Montana has declined most dramatically in the Missouri River drainage, where genetically pure populations currently occupy less than five percent of their historic range. Factors contributing to this decline include over-harvest, “habitat loss and degradation” (MFWP 2005), competition and hybridization with stocked nonnative trout, in-stream barriers, and other land and water use practices (Sloat 2001). Recently, U.S Fish and Wildlife Service (USFWS 2003) concluded that there was insufficient justification to list the westslope cutthroat as threatened. The Bureau of Land Management (BLM) categorizes it as having Special Status, which indicates that the species is "imperiled throughout at least part of its range and documented to occur on BLM lands.” It is currently listed as a GS-S2 species by MFWP, meaning that it is "at risk because of very limited and potentially declining numbers extent, and/or habitat, making it highly vulnerable to global extinction or extirpation in the state" (MFWP 2004a).

Current management actions by federal and state agencies focus on identifying and protecting remaining populations, evaluating areas that provide suitable habitat for range expansion, and expanding the distribution of genetically pure strains (Sloat 2001). The Westslope Cutthroat Trout Steering Committee, comprised of representatives from federal and state agencies and private organizations, was formed to restore westslope cutthroat to native streams east of the Continental Divide (FERC 1999). Genetically pure strains persist in some of the headwaters of unobstructed tributaries within their former range where reduced temperatures appear to provide them with a competitive advantage over introduced trout species (Sloat 2001).

3.1.2.2 Fluvial Arctic Grayling

The fluvial Arctic grayling occurred historically in the Missouri River Basin above Great Falls and were first documented in the Beaverhead River Basin by Lewis and Clark in 1805 (USFWS 2004). They are characterized by a large, sail-like dorsal fin and black spots concentrated on the anterior portion of the body (Photo 3-2). Grayling spawn in the spring by broadcasting their eggs over gravel. In recent years, they have been stocked into the Beaverhead downstream of Dillon, Montana (Table 3-1) in an attempt to re-establish the species (MFWP 2004b). However, instream barriers (MFWP 2005), low flows and increased water temperatures associated with a prolonged drought have contributed to reduced success with these attempts and stockings were temporarily discontinued in 2002 (MFWP 2004c). Comments from MFWP (2005) on the Draft License Application stated that “the species has been found throughout the length of the Big Hole River and in many of its tributaries. Individuals have also been found in both the upper Jefferson and lower Beaverhead rivers in the 1980s and 1990s. These fish were not part of FWP stocking efforts to reintroduce grayling to other streams. USFWS documents prior to the construction of Clark Canyon Dam documented the presence of Arctic grayling

Photograph 3-1. Westslope cutthroat trout (photo courtesy of MFWP).

Photograph 3-2. Montana Arctic grayling (photo courtesy of MFWP).

Table 3-1. Stocking record for Montana Arctic grayling in the Beaverhead River below Dillon, Montana.

Date	No. of Fish	Length (inches)	Hatchery Source
6/17/2002	2,552	8.4	Bluewater Springs Trout Hatchery
6/17/2002	5,105	8.4	Bluewater Springs Trout Hatchery
6/12/2002	5,955	8.4	Bluewater Springs Trout Hatchery
6/12/2002	6,351	8.4	Bluewater Springs Trout Hatchery
6/10/2002	6,020	8.2	Bluewater Springs Trout Hatchery
6/10/2002	6,063	8.4	Bluewater Springs Trout Hatchery
5/7/2002	5,065	4.3	Murray Springs Trout Hatchery
6/19/2001	6,231	7.1	Big Springs Trout Hatchery
6/19/2001	6,237	7.6	Big Springs Trout Hatchery
7/25/2000	484	6.9	Big Springs Trout Hatchery
6/22/2000	14,528	6.1	Big Springs Trout Hatchery
8/17/1999	5,760	8.5	Big Springs Trout Hatchery
8/3/1999	6,148	8.0	Big Springs Trout Hatchery
7/29/1999	6,344	8.3	Big Springs Trout Hatchery

Source: MFWP (2004g)

populations in the Red Rock and Beaverhead rivers below Lima Dam" (MFWP 2005). This fluvial strain of the Arctic grayling are not known to occur in the project vicinity (MFWP 2004b).

Currently, fluvial Arctic grayling remains a Candidate Species for listing with the USFWS (1996) and is listed as Sensitive by the USFS, indicating there is a concern for population viability within the state due to a significant current or predicted downward trend in populations or habitat. BLM affords the species Special Status. MFWP lists it as G1-S1, indicating it is "at high risk because of extremely limited and potentially declining numbers, extent, and/or habitat, making it highly vulnerable to global extinction or extirpation in the state" (MFWP 2004a).

Populations of fluvial Arctic grayling in Montana during this century have declined drastically from historic numbers. In contrast to adfluvial/lacustrine populations, fluvial grayling occupy riverine habitat throughout the year. Ongoing threats to populations of fluvial Arctic grayling include "instream barriers"(MFWP 2005), water quality and quantity depletion, competition with introduced species, predation, habitat degradation, and angling pressure. Water quantity issues include drought and recruitment limitation due to sudden runoff events. The Fluvial Arctic Grayling Workgroup was established in 1995 to direct recovery efforts for this species. These efforts include development of a broodstock for re-introductions, identification of suitable streams for range expansion, implementation of catch-and-release only regulations, and protection of minimum instream flows (Byorth 1996).

3.1.3 Status of Fishery

3.1.3.1 Beaverhead River

Rainbow and brown trout population data has been collected in the project vicinity at various locations since 1966 (Oswald 2005). Sampling within the Hildreth section of the Beaverhead River has revealed that densities of 18+-inch brown trout range from approximately 400 per mile at lower winter flow regimes (mean flow of 50 cfs or less) to more than 800 per mile when mean winter flows were 350 cfs or greater. A similar pattern was found for 18+-inch rainbow trout where densities ranged from 150 to 350 per mile across these same flow regimes (USBR 2006). These data suggest that substantially higher winter flows produce significantly greater survival rates. Diminished winter flows are often linked to drought conditions, the impacts of which have been relatively severe in the Beaverhead River Basin in recent years.

3.1.3.2 Clark Canyon Reservoir

Clark Canyon Reservoir is classified as a mesotrophic lake and is supplied primarily by water from the Red Rock River and Horse Prairie Creek (FERC 1988b; MFWP 2005). At full pool, it covers 4,815 acres with a maximum depth of 94 feet. Peak summer surface temperature is 70˚F. MFWP lists seven fish species in Clark Canyon Reservoir. Based on gill netting surveys: rainbow trout, white sucker and redside shiners are considered abundant; brown trout and burbot are considered common; and brook trout, mountain whitefish, carp and westslope cutthroat trout are considered rare (MFWP 2004g).

Stocking of rainbow trout in the reservoir has occurred annually for many years (MFWP 2004f). A record of the stocking program since 1990 appears in Table 3-2. In 2003, stocking of 200,000 Age-0 rainbow trout was temporarily suspended because of poor projected survival due to continuing, severely reduced reservoir levels which had also impacted the success of stockings from two years prior. MFWP has recommended 60,000 acre-feet as the minimum reservoir volume necessary to sustain a healthy fishery. At this level, approximately 3,000 acres of habitat are available for primary production and growth and survival rates of rainbow trout are improved substantially. Optimum fishery conditions are achieved at approximately 100,000 acre-feet and greater. To augment the existing reservoir population, MFWP has harvested spawning Eagle Lake strain rainbow trout as broodstock from the Red Rock River since 1995 and monitored the population in the river since 1986. Since its inception, the program has provided nearly half a million eggs that have been raised for stocking into Clark Canyon Reservoir and other waters. Declining spawning habitat in the Red Rock River from prolonged drought has made the program particularly critical to the reservoir fishery (USBR 2006).

Relative abundance of rainbow and brown trout in Clark Canyon Reservoir has been documented since 1964 by gill netting. Again, decreases in rainbow and brown trout abundance appear to be strongly related to reservoir levels which may impact the fishery through both reduced habitat and reduced angler access to boat ramps (MFWP 2005).

Due to recent fishery impacts related to drought, MFWP elected to reduce the bag limit on all trout species from 5 to 2 in August 2003 (MFWP 2004f). The bag limit was increased back to 5 at the start of the 2004 season (MFWP 2004e), but may be reduced again if conditions warrant.

3.1.4 Aquatic Invertebrate Community

No specific information on the aquatic invertebrate community in the Beaverhead River was available for this document. It is likely, however, that physical and chemical conditions immediately below Clark Canyon Dam are similar to other bottom draw reservoir tailwaters. Under such conditions: 1) nutrient levels are often elevated due to reservoir inputs, 2) gravels and other intermediate-sized substrates are often diminished due to reservoir retention of upstream sources, and 3) regulated flow regimes typically reduce channel and habitat complexity over time. As a result, aquatic invertebrate richness is commonly reduced and often dominated by 1) collectors (such as blackflies and caddisflies), which thrive on the fine organic matter exported from the reservoir, 2) grazers (such as many mayflies), which feed on the abundant algae nourished by elevated nutrient levels, and 3) amphipods, zooplankton and other lacustrine invertebrates originating from the reservoir. Although diversity is typically reduced for some distance below dams, total density is often increased over background (Ward and Stanford 1979).

Table 3-2. Stocking record for rainbow trout in Clark Canyon Reservoir since 1990.

Date	No. of Fish	Length (inches)	Hatchery Source
5/19/2003	13,657	6.5	Giant Springs Trout Hatchery
5/15/2003	11,550	7.0	Giant Springs Trout Hatchery
5/15/2003	11,880	7.0	Giant Springs Trout Hatchery
4/10/2003	7,800	7.9	Washoe Park Trout Hatchery
4/9/2003	7,020	7.8	Washoe Park Trout Hatchery
4/9/2003	7,020	7.8	Washoe Park Trout Hatchery
4/8/2003	7,020	7.8	Washoe Park Trout Hatchery
4/7/2003	7,020	7.8	Washoe Park Trout Hatchery
4/4/2003	7,020	7.8	Washoe Park Trout Hatchery
4/3/2003	7,020	7.8	Washoe Park Trout Hatchery
6/5/2002	10,463	6.5	Big Springs Trout Hatchery
6/5/2002	4,680	5.8	Big Springs Trout Hatchery
6/3/2002	14,880	6.5	Big Springs Trout Hatchery
4/18/2002	11,055	7.2	Washoe Park Trout Hatchery
4/17/2002	11,880	7.2	Washoe Park Trout Hatchery
4/17/2002	1	1.0	Big Springs Trout Hatchery
4/17/2002	9,900	7.2	Washoe Park Trout Hatchery
4/15/2002	8,910	7.2	Washoe Park Trout Hatchery
4/11/2002	7,920	7.2	Washoe Park Trout Hatchery
6/21/2001	27,000	5.0	Ennis National Fish Hatchery
6/6/2001	56,536	4.0	Ennis National Fish Hatchery
6/5/2001	84,328	4.0	Ennis National Fish Hatchery
6/4/2001	80,564	4.0	Ennis National Fish Hatchery
6/6/2000	200,000	4.0	Ennis National Fish Hatchery
6/7/1999	34,260	4.4	Bluewater Springs Trout Hatchery
6/3/1999	36,720	4.4	Bluewater Springs Trout Hatchery
6/3/1999	36,720	4.4	Bluewater Springs Trout Hatchery
6/1/1999	37,944	4.3	Bluewater Springs Trout Hatchery

Table 3-2. Stocking record for rainbow trout in Clark Canyon Reservoir since 1990.

Date	No. of Fish	Length (inches)	Hatchery Source
6/1/1999	47,430	4.3	Bluewater Springs Trout Hatchery
6/2/1998	34,362	3.9	Bluewater Springs Trout Hatchery
5/28/1998	55,741	3.8	Bluewater Springs Trout Hatchery
5/26/1998	55,822	3.8	Bluewater Springs Trout Hatchery
5/26/1998	54,443	3.8	Bluewater Springs Trout Hatchery
6/11/1997	50,275	4.3	Bluewater Springs Trout Hatchery
6/11/1997	32,436	4.3	Bluewater Springs Trout Hatchery
6/9/1997	29,105	4.2	Bluewater Springs Trout Hatchery
6/9/1997	37,891	4.2	Bluewater Springs Trout Hatchery
6/2/1997	37,011	4.0	Bluewater Springs Trout Hatchery
6/18/1996	42,688	3.8	Bluewater Springs Trout Hatchery
5/29/1996	53,530	4.2	Bluewater Springs Trout Hatchery
5/28/1996	50,502	3.9	Bluewater Springs Trout Hatchery
5/28/1996	63,128	3.9	Bluewater Springs Trout Hatchery
6/13/1995	35,437	4.3	Bluewater Springs Trout Hatchery
6/13/1995	10,000	4.3	Bluewater Springs Trout Hatchery
6/1/1995	45,239	4.3	Bluewater Springs Trout Hatchery
5/30/1995	58,905	4.0	Bluewater Springs Trout Hatchery
5/30/1995	51,122	4.1	Bluewater Springs Trout Hatchery
5/31/1994	64,440	3.3	Big Springs Trout Hatchery
5/31/1994	66,588	3.3	Big Springs Trout Hatchery
5/31/1994	66,588	3.3	Big Springs Trout Hatchery
6/16/1993	39,524	2.8	Giant Springs Trout Hatchery
6/16/1993	17,000	3.4	Giant Springs Trout Hatchery
6/16/1993	33,200	2.5	Giant Springs Trout Hatchery
6/15/1993	6,800	3.4	Giant Springs Trout Hatchery
6/8/1993	55,100	3.2	Big Springs Trout Hatchery
6/8/1993	50,540	3.2	Big Springs Trout Hatchery

Table 3-2. Stocking record for rainbow trout in Clark Canyon Reservoir since 1990.

Date	No. of Fish	Length (inches)	Hatchery Source
6/18/1992	19,910	4.0	Big Springs Trout Hatchery
6/9/1992	16,972	4.0	Big Springs Trout Hatchery
6/9/1992	44,583	3.9	Big Springs Trout Hatchery
6/9/1992	59,680	4.0	Big Springs Trout Hatchery
6/9/1992	69,480	3.9	Big Springs Trout Hatchery
5/20/1992	20,000	2.5	Giant Springs Trout Hatchery
5/6/1992	19,433	2.4	Giant Springs Trout Hatchery
6/18/1991	29,766	3.8	Big Springs Trout Hatchery
6/18/1991	44,850	3.5	Big Springs Trout Hatchery
6/18/1991	34,385	3.5	Big Springs Trout Hatchery
6/10/1991	22,114	4.5	Bluewater Springs Trout Hatchery
6/31991	29,498	4.4	Bluewater Springs Trout Hatchery
5/3/1990	11,166	5.7	Big Springs Trout Hatchery
5/3/1990	24,570	5.8	Big Springs Trout Hatchery
4/25/1990	27,422	5.6	Big Springs Trout Hatchery
4/18/1990	27,810	5.5	Big Springs Trout Hatchery

Source: MFWP (2004d)

Water quality in the project vicinity is considered good for coldwater aquatic life and riparian vegetation appears to be in good condition; however, reduced flows and increased temperatures associated with persistent drought conditions may be harming and thereby reducing abundance of invertebrates less tolerant to these conditions. Downstream of Grasshopper Creek, there has been additional impairment due to further elevated temperatures, sedimentation, non-point source pollution, and habitat alteration and degradation (HRCD 2004).

3.1.5 Fish Resources Management Objectives

Recently, MFWP listed these general, statewide goals in its Draft Six-Year Fishery Management Plan:

- Manage the state's fishery resources for their recreational, scientific, and aesthetic purposes, as well as for their inherent value;
- Protect and restore stream and lake habitats with existing laws, rules, regulations, educational programs, and state-of-the-art technology;
- Protect and restore species of concern, as well as threatened and endangered species, regardless of their sport fish potential;
- Represent the interest of fisheries in the allocation and development of water resources;
- Determine the public's needs for access to fisheries and work to provide that access;
- Expand and improve the availability of fishing opportunities in lakes and streams; and,
- Enforce regulations that effectively control angler harvest and protect the state's fishery resources.

Further, to ensure that Montana waters continue to offer diverse fishing opportunities, over the next six years MFWP has committed to: 1) establish more self-sustaining wild fisheries and support responsible use of hatchery-reared fish; 2) prepare and implement management plans for priority fisheries; 3) evaluate management strategies through angler surveys and population monitoring; 4) manage and enhance populations to increase sport-fishing opportunities; 5) monitor fish health and implement disease prevention strategies; 6) regulate commercial fishing operations; 7) implement and enforce regulations, rules and statutes to protect aquatic resources; and 8) maintain a modern database system for aquatic resources.

Management approaches to maintaining trophy trout fisheries in many Montana waters have shifted from an augmentation program of stocking domesticated rainbow trout to a wild trout management program geared toward identifying and enhancing sources of natural recruitment for both native and nonnative trout species. Trout are no longer stocked into the Beaverhead River, but are stocked into Clark Canyon Reservoir during most years.

The Westslope Cutthroat Trout Steering Committee, consisting of federal/state agencies and other interested organizations, has developed a management program designed to help restore genetically pure populations of native westslope cutthroat trout to suitable drainages within their former range. Declining populations of competing rainbow and brown trout may improve chances for the success of this recovery program (FERC 1999).

The Fluvial Arctic Grayling Workgroup was established in 1995 to direct recovery efforts for this native species. Its objectives include development of a broodstock for re-introductions, identification of suitable streams for range expansion, implementation of catch-and-release only regulations, and protection of minimum instream flows (Byorth 1996).

Whirling disease has been found in several tributaries to the Beaverhead River including Clark Canyon (RM 73.2), Poindexter Slough (RM 52.0), and the Ruby River (RM 6.3) (MWDTF 2004). In addition, comments from MWFP state that whirling disease is also found in the tributaries of the Beaverhead including Red Rock River, Horse Prairie Creek and Big Creek (MFWP 2005). The continuing impact of whirling disease on trout (primarily rainbow and brown) populations in Montana waters is being addressed through an adaptive management program with the objectives of: 1) implementing an information and education plan to inform the public of the presence of whirling disease and outlining steps to prevent the spread of the disease; 2) determining the extent of whirling disease occurrence in Montana waters including federal, state, and private hatcheries; and, 3) initiating new angling regulations carefully integrated with an MFWP policy of wild trout management to benefit trout populations impacted by the disease (Vincent 1996).

MFWP has implemented a number of management options to improve the fisheries in the Beaverhead River within the project vicinity. To mitigate for fish losses due to drought-induced, low-flow conditions, MFWP closed the Beaverhead River below Anderson Lane (approximately 5 miles downstream of Dillon) to fishing in 2003 (MFWP 2004e). Currently, the bag limit for all trout combined is three with only one rainbow trout and only one trout over 18 inches. Intense boating pressure between High Bridge FAS and Henneberry FAS prompted MFWP to close it to float fishing by non-residents and float outfitting on each Saturday from the third Saturday in May through Labor Day. The section between Henneberry FAS and Pipe Organ FAS is closed to those individuals during the same period on each Sunday (MFWP 2004f). Management efforts to mitigate for drought conditions also “include flow and thermal monitoring efforts and fall angling closures (October and November between the dam and Selway Bridge in Dillon) to protect spawning brown trout and mountain whitefish at low flow” (MFWP).

Montana Department of Environmental Quality (MDEQ) is working with the Environmental Protection Agency (EPA) to establish Total Maximum Daily Loading (TMDL) levels of nutrients for all Montana watersheds appearing on the 303(d) list of the Clean Water Act. TMDLs for the Beaverhead River Basin are scheduled for completion in 2006 with the purpose of identifying point and non-point pollutant sources and setting limits on loading (MDEQ 2000).

3.1.6 Potential Project Effects on Aquatic Resources

A license to build and operate a hydroelectric project on Clark Canyon Dam was first submitted by the East Bench Irrigation District in 1988 and later approved by the Federal Energy Regulatory Commission (FERC 1988a). An Environmental Assessment (EA) of the proposed project identified a number of fisheries resource issues of concern. These included potential water quality effects on the trout fisheries due to construction (e.g., sediments and other pollutants) and operation (total dissolved gases) of the project and maintaining minimum flows in the Beaverhead River below Clark Canyon Dam.

Major construction activities that have the potential to affect aquatic resources in the project area include construction of the powerhouse, construction of a cofferdam to protect the powerhouse during construction and reduce sedimentation, excavation and construction of the powerhouse tailrace, installation of a steel penstock inside the existing penstock, and construction of a new valve house.

Potential construction-related impacts to aquatic resources in the project vicinity include:

1) Potential releases of sediment into the Beaverhead River during construction activities, which may impact aquatic invertebrates and trout, particularly fry, which utilize interstitial void spaces in the river substrate.

These impacts would be minimized through the implementation of the proposed plan provided in this document (Appendix III).

2) Maintenance of quantity and quality of in-stream flows below project during project construction.

The applicant proposes to provide the necessary flows via two bypass conduits inserted into the existing penstock. These conduits would provide the same quantity and quality (water would be withdrawn from same depth) as under existing conditions (see Fisheries Protection Plan, Appendix IV).

3) Erection of a cofferdam during construction to reduce sedimentation may trap fishes in the water that collects behind it.

Fishes may become trapped behind the cofferdam and suffer undue stress or mortality over a sufficient period of time due to food deprivation, elevated temperatures, or reduced oxygen levels. Although the danger of this occurring would be slight, the Applicant would conduct electrofishing salvages by boat as needed to capture these fishes and return them safely to the river.

4) Temporary disturbance to anglers and other recreationists in the project area, due both to actual construction and associated movement of equipment.

These impacts would be minimized to the extent possible by limiting the area of the construction site and by continuing to provide some degree of angler access to the river immediately below the site. Interference with floating anglers within the project area should be fairly low since boating access is relatively limited immediately below Clark Canyon Dam. Most boaters apparently enter the river at High Bridges FAS, located about two miles downstream, where access is better.

5) Some increased entrainment of reservoir fishes may occur during the pumping phase of project construction. Therefore, 0.5-inch screens will be fitted on the pump intakes to reduce fish entrainment (see Appendix IV, Fisheries Protection Plan).

No other construction-related impacts to aquatic resources are anticipated.

Potential operation-related effects on aquatic resources in the project vicinity include:

1) Entrainment of fishes in the intake structure and associated mortality of some individuals passing through the powerhouse turbine.

In the EA performed for the original project license application (Appendix II), burbot were identified as the principal species subject to potential entrainment in Clark Canyon Reservoir due to their benthic habits and the existing hypolimnetic withdrawal. The document stated that Reclamation "currently withdraws water from the bottom of the reservoir, entraining some bottom-dwelling fish such as burbot, but trout have not been affected" (FERC 1988b). MFWP (2005) reported that rainbow and brown trout and burbot were entrained, but all appeared to suffer distended swim bladders indicative of rapid pressure changes. Burbot are not a protected species, but they are a sport fish with recognized recreational value and classified as a native game fish. They are currently ranked SU on the FWP-AFS Potential Species of Concern List.

As envisioned currently, the Clark Canyon project would utilize two Francis turbines. The larger units would possess a runner diameter of 1.28 m and a rotational speed of 400 rpm. The smaller unit would have a diameter of 1.00 m and a speed of 514 rpm. Each unit would have 13 blades (Mark Barandy, VA TECH Bouvier Canada Inc.). Gross operating hydraulic head for the two turbine/generator units would range between approximately 18 and 29 m. Generally, smaller diameters, higher speeds, more blades and larger fish sizes result in higher mortality (Franke et al. 1997).

Franke et al. (1997) provided a summary of the results of studies examining mortality of different sizes of various salmonid species during passage through Francis turbines. They noted that higher blade-to-diameter (N/D) ratios generally increase fish mortality. Runner diameter in those studies ranged from 1.40 to 4.67 m. The number of blades ranged from 15 to 16, although this number may range from as few as 11 to as many as 25 blades. The proposed turbines would have a relatively low number of blades (13), but relatively narrow runner diameters of 1.00 and 1.28 m. In previous studies involving salmonid fishes (Franke et al. 1997), N/D ratios ranged from 3.2 to 11.4. N/D ratios for the larger and smaller project turbines would be relatively high at 13.0 and 10.1, respectively, which in combination with relatively high runner speeds of 400-500+ rpm will likely cause greater mortality of fishes than was typically observed in those studies. Mortality rates in the studies cited above averaged 27 percent. Therefore, it is reasonable to assume that turbine-related fish mortality at the project site would exceed 30 percent.

Substantially increased mortality of these fish species during turbine passage should be a minor project impact considering the high mortality rates which reservoir fishes already experience during passage. MFWP (2005) has commented that "it is highly unlikely that rainbow or brown trout can survive the pressure differential of entrainment into the bottom draw outlet works. Adult burbot that were entrained in 1984 also exhibited a very high incidence of mortality with most of the dead fish exhibiting extremely distended swim bladders indicative of this pressure differential". Therefore, the Applicant has proposed no protective measures such as fish screens to reduce entrainment and potential mortality of reservoir fishes.

2) Changes in quantity (e.g., discharge and ramp rate) and quality (e.g., dissolved oxygen and temperature) of the water released into the Beaverhead River from historic conditions may impact fisheries resources.

The project is proposed as a run-of-the-river operation, with no changes to the water quality or the flow regime of the river downstream of Clark Canyon Dam that occurs under existing conditions. In addition, the applicant acknowledges concerns by the resource agencies regarding establishment and maintenance of minimum instream flows to protect fisheries resources and agrees to work with the agencies toward achievement of those goals.

3.1.7 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document (FSCD) in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. The Montana Fish, Wildlife and Parks Area Fisheries Management Biologist, Richard Oswald, submitted "several general comments pertinent to the project proposal and its potential to affect fisheries resources and habitats in the Beaverhead River;" as well as "a number of comments specific to assumptions and statements in the document."

In their letter, dated January 10, 2005, the MFWP does not view the proposed project as a new or additional threat to fisheries of fish habitat with the caveat "that power generation would only occur within normal irrigation or flood control release and storage regimes." They also submit that the project could benefit:

1) fish habitat in the river - if accompanied by an increase in minimum instream flow release;

2) reservoir fisheries and recreation - with the incorporation of minimum reservoir storage pool not associated with irrigation; and,

3) fisheries - if outlet releases through the turbines eliminated or substantially reduced gas supersaturation at the outlet works.

The agency comments also stated that the "generation of significant amounts sediment" into the Beaverhead River should not be an issue as long as "normal precautionary measures and best management practices associated with streambank construction are applied during the construction phase."

Comments also stated that the FSCD did not address project permitting with regard to "existing stream protection laws" including "the Montana Stream Protection Act (124) or Montana Natural Land and Streambed Preservation Act (310) permitting, state 318 Authorization for turbidity, and federal 404 Authorization..."

The first four comments of the 25 "specific comments and questions" from MFWP pertain to project features and are addressed in Exhibit A, Project Description.

In their specific comments, labeled as #s 5 - 13, MFWP took issue with certain statements, figures and graphs within the document. A summary of the comments are provided below.

There were comments with time-frame suggestions on mitigation plans with regard to sedimentation impacts and "excavation construction windows" to avoid: 1) spawning periods; 2) mitigation efforts to avoid affects of dewatering; and, 3) mitigation plans to avoid construction disturbances to anglers.

Agency biologists stated that 'burbot' were misrepresented as "not a protected species nor are they a sport fish with recognized recreational value." The species is currently a candidate for inclusion in an "AFS Potential Species of Concern List and will be evaluated for classification in 2005. They further stated that given this possible change in status, the Permitee should be required to "propose studies and/or mitigative measures to address potential losses of burbot to the reservoir fishery" through the possibility of raising the current minimum flow release of 25 cfs to 200 cfs which is the MFWP "Minimum Recommended Flow."

MFWP "strongly urges full implementation of construction measures that eliminate or substantially mitigate sediment production into the river." As such, agency biologists state that the proposed study of "annual recruitment and survival of Age 0 fish" could prove "interesting" but is not considered "an acceptable substitute for sediment mitigation measures during construction."

Similarly, MFWP states that the collection of aquatic macroinvertebrate data could provide a "valuable data set for the river" but nonetheless "advocates strong mitigative measures to control sediment output during construction" rather than more studies.

In a related comment, MFWP states the identifying macroinvertebrates to the taxonomic "family level is unacceptable" as well as asking "why is testing macroinvertebrates for arsenic being proposed as a parameter of this study." Regarding gas bubble disease symptoms observed in trout in the Beaverhead River, MFWP "wonders why no studies to monitor gas supersaturation levels before and after installation and operation of the hydroelectric plant have been proposed in the document."

MFWP stated that the agency "supports the collection and analysis of base lotic water quality parameters above and below Clark Canyon Reservoir...in order establish baseline chemical conditions below the dam, we recommend that a broad reange of samples be collected over the range of release regimes as well as on a time duration basis."

There were three additional comments; #s 22, 23, 24 regarding recreational resources which MFWP took issue with. Lastly, MFWP states: "Development and operation of a hydroelectric facility could directly affect and improve recreational activity if it was accompanied by a sufficient minimum reservoir pool and improved minimum instream flow in the river."

3.1.8 Applicant Recommendations

ERI has prepared a Soil Erosion Control and Revegetation Plan as well as a Fisheries Protection Plan for the project which are included as appendices IV and V, respectively.

In June of 1988, the Federal Energy Regulatory Commission (FERC) granted an "Order Issuing License" to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a "Finding Of No Significant Impact." The project described within this Draft License Application is similarly proposed to create no significant impacts. Within the "Order Issuing License" document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures and supports the premiss behind the Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project. In addition, the Applicant will consult with the all resource agencies and other pertinent parties to address further resource concerns.

3.1.9 Final Agency Comments and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

3.2 Wildlife Resources

3.2.1 Habitat

The project area contains limited wildlife habitat consisting of open water, riparian meadows, and upland sagebrush steppe. Immediately downstream of the tailrace, springs create a marsh wetland adjacent to the Beaverhead River. This wetland provides feeding and limited nesting habitat for gulls (*Larus* spp.), cormorant (*Phalacrocorax auritas*), sandhill cranes *(Grus canadensis*) and other waterfowl (Jim Roscoe, BLM, pers comm.). Open water provides feeding areas for waterfowl, bald eagle and osprey, and breeding habitat for amphibians. Mule deer (*Ondatra zibethicus*), moose (*Alces alces*), pronghorn (*Antilocapra americana*), and elk *(Cervus elaphus*) occasionally use riparian meadows (Jim Roscoe, BLM, pers. comm). Songbirds may also feed and nest in these habitats. Small mammals such as mink (*Mustella vison*), muskrat (*Ondatra zibethicus*), and voles (*Microtus* sp.) may den along the banks of the tailrace and frequent meadow habitats. Upland steppe provides feeding, breeding, and nesting habitat for game birds, such as sage grouse (*Centrocercus urophasianus*), songbirds, and raptors, such as ferruginous hawk (*Buteo regalis*). Pronghorn (*Antilocapra americana*) and mule deer also feed and rear young in sage steppe habitats. Proximity to Interstate Highway 15 may diminish the value of project area habitats to wildlife.

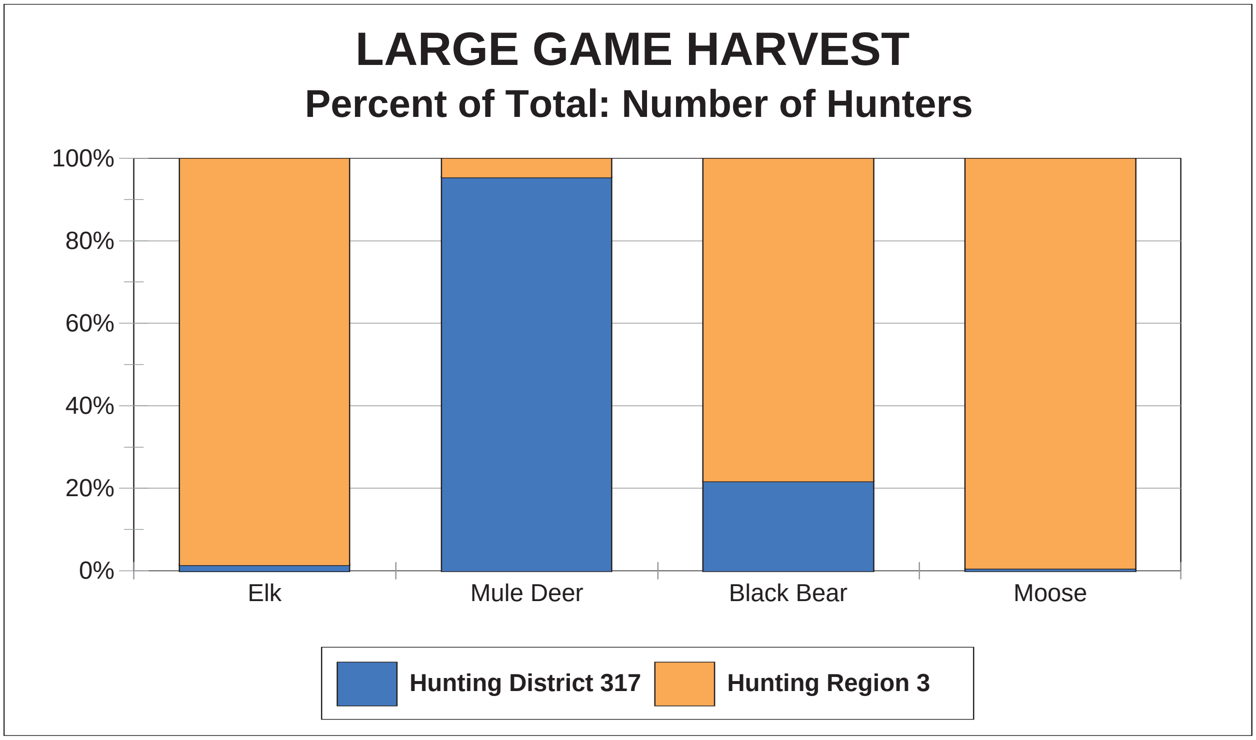
3.2.2 Game Species

Proximity to Interstate 15 limits the value of the project area with respect to game species. The Clark Canyon Dam project area encompasses portions of black bear management units 316 and 317; deer and elk hunting districts 302, 325 and 329; antelope hunting districts 300, 329 and 330; and, moose hunting districts 300, 301 and 332 of Montana Fish, Wildlife and Parks (MFWP) Region 3. Game species tracked within these hunting districts include elk, mule deer, white-tailed deer, antelope, upland game birds and black bear (Table 3-3; MFWP 2003).

Of large game species, mule deer attract the greatest number of hunters in District 317, followed by elk and black bear. Harvest of mule deer totaled 212 deer in 2002. Harvest within District 317 comprised 2.4 percent of mule deer harvest in Region 3, 1.9 percent of elk harvest, and 13 percent of black bear harvest (Figure 3-2). Blue grouse are the most sought after game bird in the district, followed by sage grouse; 386 hunters harvested 1,436 blue grouse in 2002, and 252 hunters harvested 959 sage grouse. In 2002, sage grouse harvest in District 317 comprised 65 percent of total harvest within Region 3 (Figure 3-3; MFWP 2003).

Table 3-3. Game species that occur in the project region (MFWP 2003).

SCIENTIFIC NAME	COMMON NAME
Big Game	
Alces alces	moose
Antilocapra americana	pronghorn antelope
Cervus elaphus	elk
Odocoileus hemionus	mule deer
Odocoileus virginianus	white-tailed deer
Ursus americanus	black bear
Upland Game Birds	
Alectoris chuckar	chuckar
Bonasa umbellus	ruffed grouse
Centrocercus urophasianus	sage grouse
Dendragapus obscurus	blue grouse
Falcipennis canadensis	spruce grouse
Perdix perdix	Hungarian partridge
Phasianus colchicus	pheasant
Tympanuchus phasianellus	sharptail grouse
Furbearing Mammals	
Canis latrans	coyote
Castor canadensis	beaver
Felis concolor	mountain lion/cougar
Felis rufus	bobcat
Gulo gulo	wolverine
Lutra canadensis	otter
Martes americana	marten
Mephitis mephitis	skunk
Mustela frenata	weasel
Mustella vison	mink
Ondatra zibethicus	muskrat
Procyon lotor	racoon
Taxidea taxus	badger
Vulpes vulpes	fox



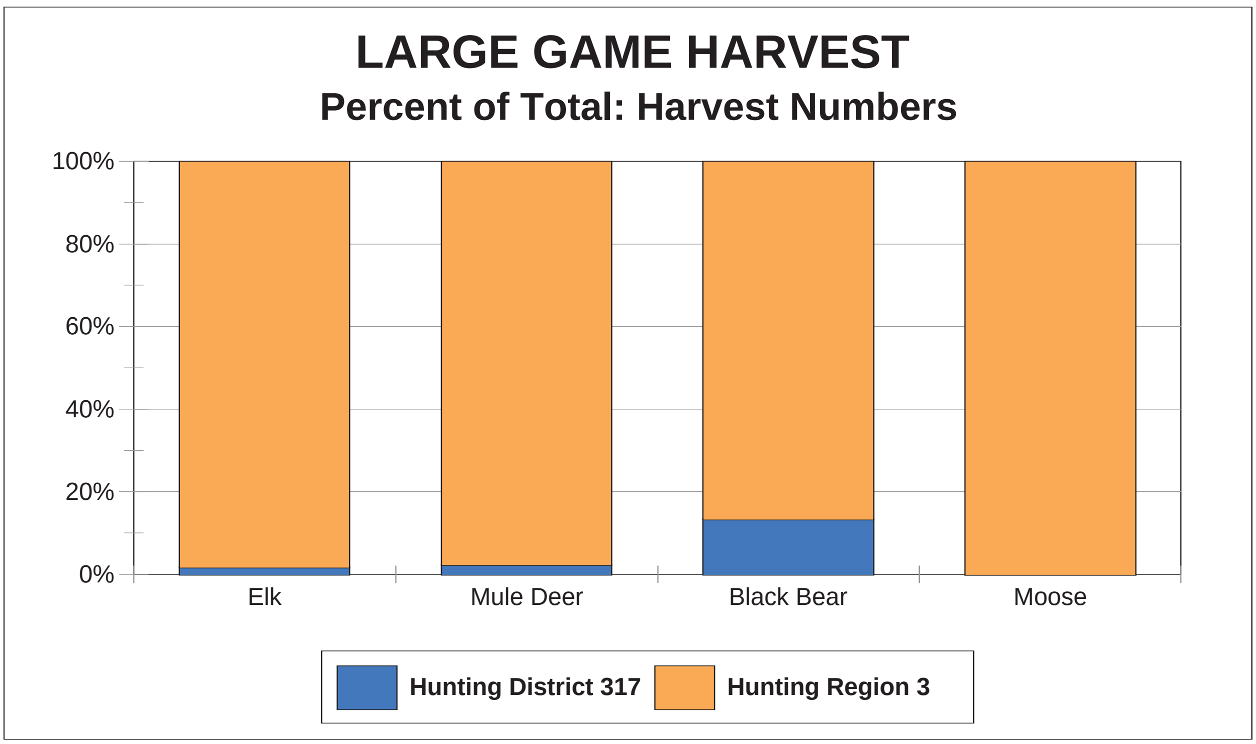
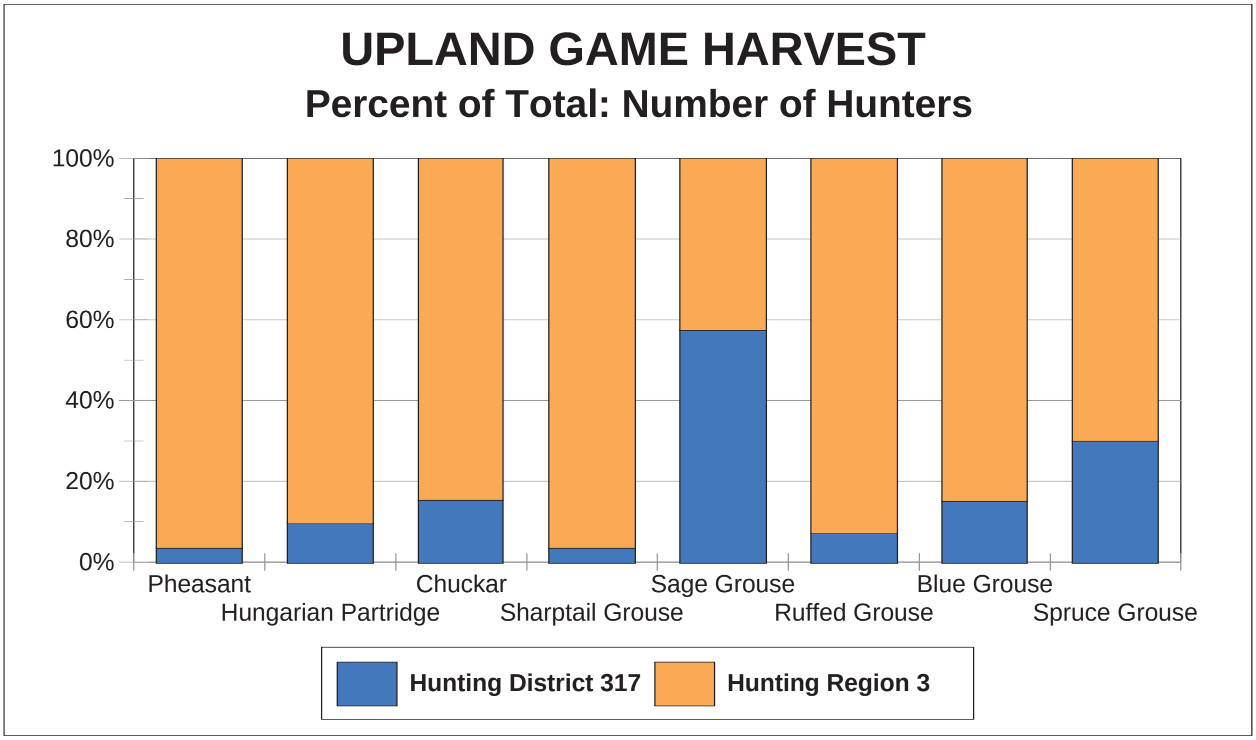


Figure 3-2. Number of hunters and large game harvest within Hunting Region 3 and Hunting District 317 (MFWP 2003).



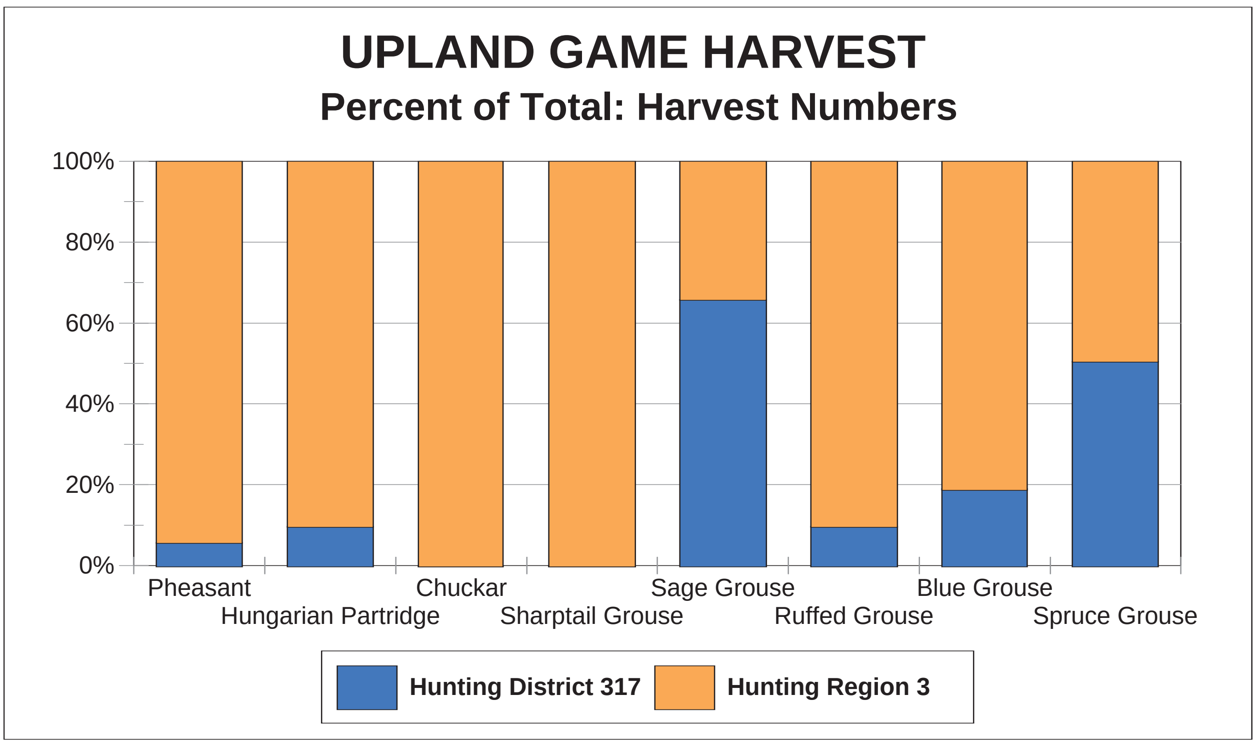
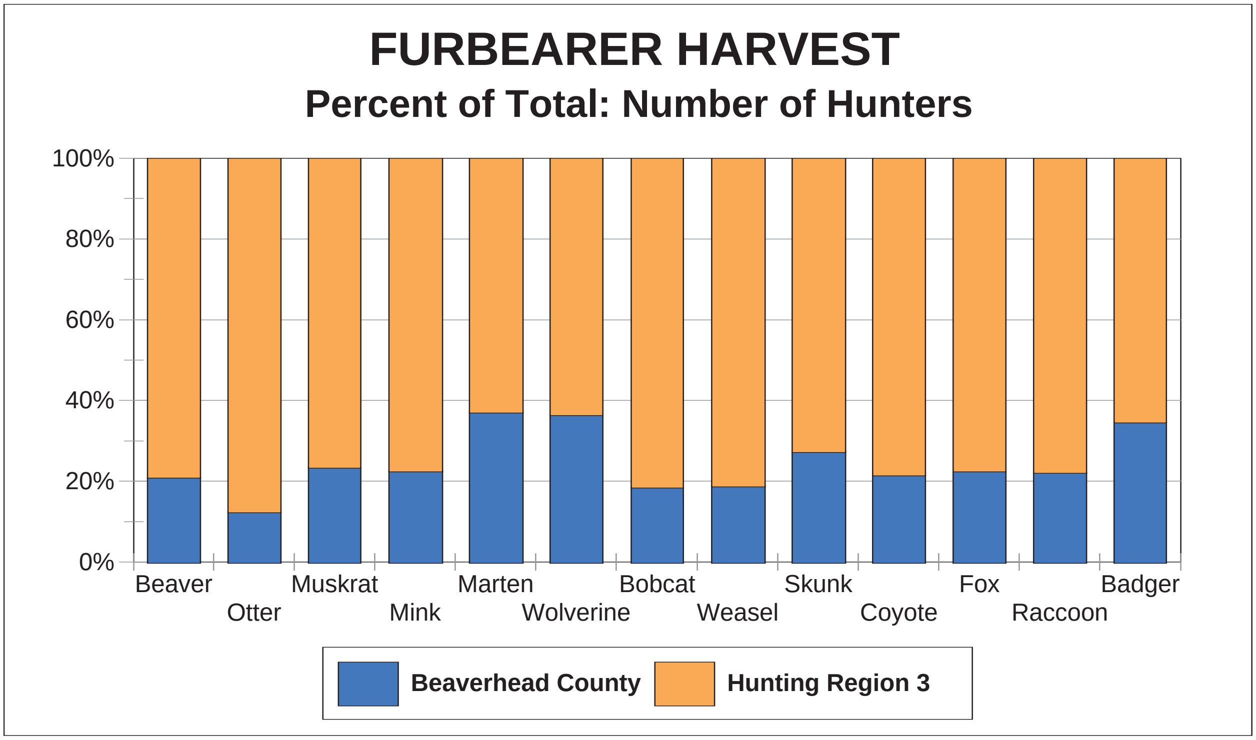


Figure 3-3. Number of hunters and upland game bird harvest within Hunting Region 3 and Hunting District 317 (MFWP 2003).



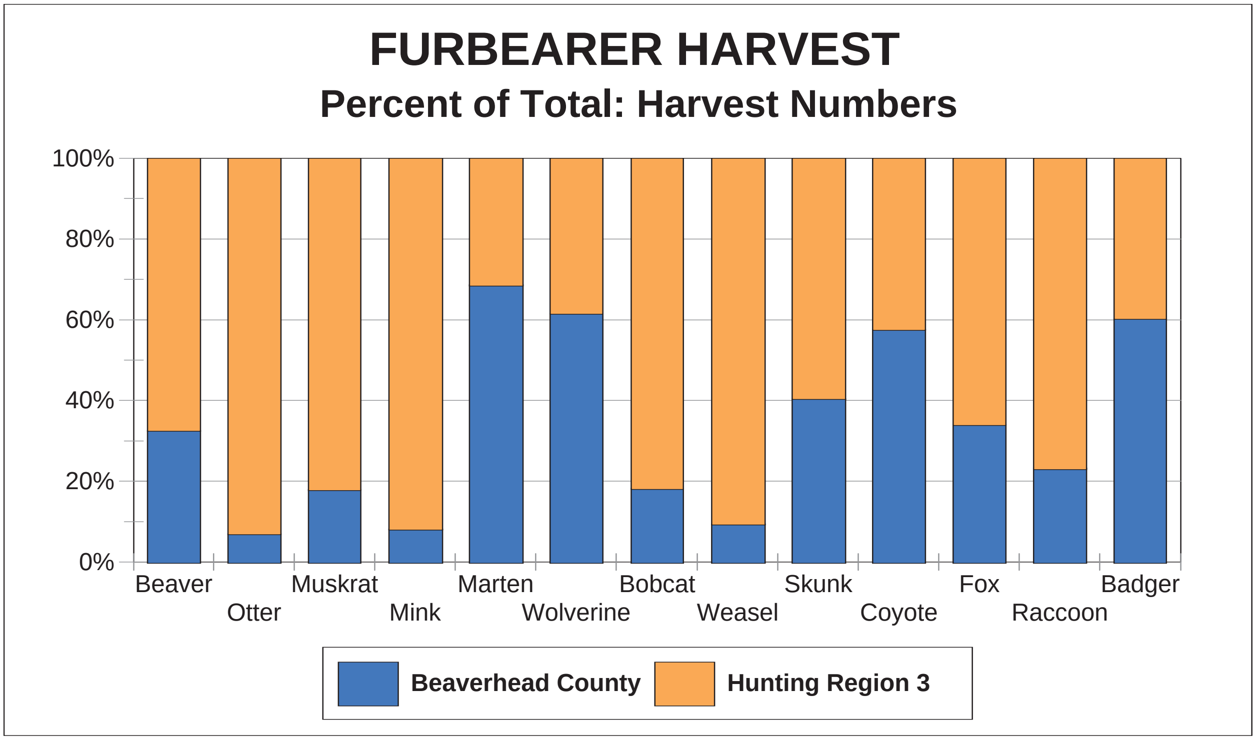


Figure 3-4. Number of trappers and furbearer harvest within Trapping Region 3 and Beaverhead County, Montana (MFWP 2003).

Fourteen species of furbearing mammals are trapped within Region 3. Within Beaverhead County, beaver were the most abundant species trapped in 2002, followed by coyote. Beaverhead County provides 31 percent of the furbearing mammals trapped in Region 3 (Figure 3-4; MFWP 2003).

3.2.3 Species of Concern

For the purposes of this document, species of concern are defined as species with a state conservation rank of 1 or 2, or agency designation as sensitive, special status, threatened or endangered. According to the Montana Natural Heritage Program (MNHP) records, there are 15 species of concern within Beaverhead County. These include five wildlife species with protection under the Endangered Species Act: bald eagle, grizzly bear, Canada lynx, peregrine falcon and gray wolf. One species of concern, the ferruginous hawk, has records from within a mile of Clark Canyon Dam (Table 3-4). Those species that are likely to occur in the project area or experience project effects are described below.

Bald eagle

The bald eagle is protected in the state of Montana and listed as threatened under the federal Endangered Species Act. Bald eagles breed from central Alaska, east to northern Saskatchewan, Labrador, and Newfoundland. Within interior North America, they nest locally to Texas, Florida, and the Gulf Coast. Eagles winter within their breeding range (Link et al. 2001). Nesting bald eagles are found locally throughout western Montana. One nesting site is known from approximately three miles downstream of Clark Canyon Dam (Jeffrey Baumberger, Reclamation, pers comm.).

Bald eagles are found primarily near seacoasts, rivers, reservoirs, and lakes. They build stick nests in tall trees and use the plains cottonwood in particular within the project area (Scott et al. 1994). Eagles catch fish principally, but also feed on carrion, waterfowl, and rabbits (Link et al. 2001). The Clark Canyon Dam tailrace area is used by the nesting pair on an occasional basis. Wintering and migratory eagles are also found in the area. Although the reservoir is frozen during the winter, eagles forage on waterfowl and gut piles left by anglers on the ice. Mid-winter eagle counts average five to ten eagles in the Clark Canyon reservoir area (Jim Roscoe, BLM, pers. comm.). Bald eagles also occur as migrants on Armstead Island within Clark Canyon Reservoir (Jeffrey Baumberger, Reclamation, pers comm.).

Ferruginous hawk

The ferruginous hawk is a BLM special status species and considered at risk for extirpation from Montana by MNHP. Ferruginous hawks breed from eastern Washington, southern Alberta, southern Saskatchewan, and southwestern Manitoba, south to eastern Oregon, Nevada, Arizona, New Mexico, north central Texas, western Oklahoma, and western Kansas. They winter from the southern part of their range to central Mexico (DeGraaf et al. 1991; Link et al. 2001). In Montana, ferruginous hawks breed in the shortgrass foothills and steppe-habitat east of the Rocky Mountains. These hawks commonly migrate south in the fall. A breeding population of 100-200 ferruginous hawk pairs is known from the Clark Canyon Reservoir area.

Table 3-4. Special status wildlife known from Beaverhead County, Montana.

Scientific Name	Common Name	State Rank	ESA Status	USFS Status	BLM Status	known within 1 mile
Accipiter gentilis	Northern goshawk	S3S4	-	Sensitive	Special status	No
Brachylagus idahoensis	Pygmy rabbit	S3	-	Sensitive	Special status	No
Buteo regalis	Ferruginous hawk	S2B	-	-	Special status	Yes
Caenis youngi	A mayfly	S2	-	-	-	No
Canis lupus	Gray wolf	S3	PS:LE,LT,XN	Endangered	Special status	No
Cygnus buccinator	Trumpeter swan	S2B,S2N	-	Sensitive	Special status	No
Euphydryas gillettii	Gillette's checkerspot	S2	-	-	-	No
Falco peregrinus	Peregrine falcon	S2B	PS:LE	Endangered	Special status	No
Lynx canadensis	Canada lynx	S3	PS:LT	-	-	No
Haliaeetus leucocephalus	Bald eagle	S3B,S3N	PS:LT,PDL	Threatened	Special status	No
Plegadis chihi	White-faced ibis	S1B	-	-	Special status	No
Sterna forsteri	Forster's tern	S2B	-	-	-	No
Strix nebulosa	Great gray owl	S3	-	-	Special status	No
Synaptomys borealis	Northern bog lemming	S2	-	Sensitive	Special status	No
Ursus arctos horribilis	Grizzly bear	S3	PS:LT,XN	Threatened	Special status	No

This area includes the Western Centennial, Horse Prairie, Sage Creek and Sweetwater Creek valleys and the Argenta Bench (MNHP 2004a).

Ferruginous hawks are found on semi-arid plains and in arid steppe habitats and prefer relatively unbroken terrain (DeGraaf et al. 1991; Link et al. 2001). In Montana they inhabit shrub steppe and shortgrass prairie. Ferruginous hawks prefer tall trees for nesting, but will use a variety of structures including mounds, short cliffs, cutbacks, low hills, haystacks, and human structures (DeGraaf et al. 1991). Ferruginous hawks feed on ground squirrels, rabbits, pocket gophers, kangaroo rats, mice, voles, lizards, and snakes. Populations can be adversely influenced by agricultural activities (Link et al. 2001).

The Clark Canyon Dam powerhouse site does not provide preferred nesting habitat for ferruginous hawks; however, nests may occur in the immediate project vicinity. Ferruginous hawks may also nest along the transmission corridor and may hunt in the vicinity.

Pygmy rabbit

The pygmy rabbit is a BLM special status species and a Beaverhead National Forest sensitive species. It is found from the Great Basin north to extreme southwestern Montana. Isolated populations are known from east central Washington and Oregon (IMNH 2000). Pygmy rabbits may be found in the project vicinity but have yet to be documented here (MNHP 2004a).

Pygmy rabbits inhabit high plains and typically use dense stands of sagebrush with loose soils for burrowing. They create relatively complex burrows and also use the burrows of other animals. Pygmy rabbits breed during the early spring; gestation is estimated at 27 to 30 days and young are born in litters of up to six. These rabbits feed on sagebrush primarily, but also ingest grasses. Predators include coyote, weasel and owls (IMNH 2000). If suitable substrate and cover are present, pygmy rabbits could use the project area for burrowing, breeding and feeding.

3.2.4 Potential Project Effects

Effects on species of concern are anticipated to be minimal. The bald eagle is the only wildlife species with protection under the Endangered Species Act that occurs within the project area. One species of concern, the ferruginous hawk, is known from the area, and habitat for pygmy rabbits may occur in the project vicinity. Other species of concern are not known to occur in the project area and important habitats for these species will not be effected by project activities.

Bald eagle

Wintering, migratory and nesting bald eagles are expected to avoid the tailrace area while construction is occurring. Bald eagles have been shown to adjust foraging times to avoid construction activities (Stangl 1999). This temporal avoidance may minimize the effect of construction on bald eagles that use the tailrace area. Construction is not expected to directly affect eagle nesting because the only known pair nest approximately three miles downstream of the dam and only forage occasionally in the project area. Transmission structures have potential to cause electrocution of bald eagles and other raptors. This hazard will be minimized by implementing recognized guidelines to reduce electrocution (APLIC 1996).

Ferruginous hawk

Ferruginous hawks nesting within a half mile of the powerhouse site may be disturbed by construction activity. These pairs are expected to be particularly vulnerable to disturbance from February through August. Construction noise during this period could result in nest failure. The project is not expected to have long-term effects on ferruginous hawks. Existing transmission facilities will be used to transport power from the project. All upgrades to these structures will be completed in compliance with standards designed to reduce the risk of avian electrocution (APLIC 1996).

Pygmy rabbit

It is unknown whether pygmy rabbits use the project area. None have been reported from the vicinity and the immediate project area receives relatively high human use. The project area may not provide suitable habitat if substrates are not adequate for burrowing. If pygmy rabbits occur in the project area, construction activity would likely pose a disturbance and could remove a small area of habitat.

3.2.5 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document (FSCD) in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. Comments related to botanical and wildlife and their habitats were received from Montana Department of Fish, Wildlife and Parks wildlife Biologist, Craig W. Fager, submitted a letter in response to the Clark Canyon Dam Hydroelectric Project's FSCD with comments specific to the project proposal as well as several general comments relating to wildlife and their habitats within the project area.

The MFWP stated in its FSCD response letter, dated January 24, 2005, that they see very little potential for the project facility to negatively impact wildlife in the project area stating: "The footprint is too small to have significant impacts and the area is already disturbed from dam development and associated recreation. The project will not affect wildlife species or their habitat downstream in the Beaverhead River."

The MFWP offered five, numbered comments pertaining to statements and data included in the FSCD with regard to botanical and wildlife resources. Three of those comments are specific to wildlife resources and they are summarized below.

> # 3) re: comments referenced to page 49; Section 6.1.2.1: correct spelling to Jim <u>Roscoe</u> and not <u>Rosco</u> as incorrectly stated in the FSCD.

4) re: comments referenced to page 49; Section 6.1.2.2: corrections to the FSCD information include: a) area encompasses portion of black bear management units 316 and 317; deer and elk hunting districts 302, 325 and 329; antelope hunting districts 300, 329 and 330; and moose hunting districts 300, 301 and 332; b) antelope hunting is “very important to the local economy, occur within the Clark Canyon Recreation Area and provide far greater recreational opportunity than black bear; and, c) white-tailed deer are also locally abundant and the Clark Canyon Recreation Area provides important access to theses resources.

5) re: comments referenced to Tables 6-2, 6-3; Figure 6-4: a) Table 6-2 should indicate white-tailed deer, mountain lion and antelope occur in the project region; b) sharptail grouse occur in trace amounts, if at all in the project area; c) chuckar are well established to the west, in Idaho, and are seen only occasionally in Montana; d) Table 6-3 should state <u>Beaverhead County</u> and not <u>Hunting District 317</u>; e) the coyote, weasel, skunk and civet cat (spotted skunk) are classified as predators in Montana; f) the badger, raccoon and red fox are considered nongame wildlife; and g) Figure 6-4 should indicate <u>Beaverhead County</u> and not <u>Hunting District 317</u>.

3.2.6 Applicant Recommendations

In June of 1988, the Federal Energy Regulatory Commission (FERC) granted an "Order Issuing License" to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a “Finding Of No Significant Impact.” The project described within this Draft License Application is similarly proposed to create no significant impacts. Within the "Order Issuing License" document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures and supports the premiss behind the Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project. In addition, the Applicant will consult with the all resource agencies and other pertinent parties to address further resource concerns.

3.2.7 Final Agency Consultation and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

3.3 Vegetation

3.3.1 Description of the Environment

Clark Canyon Dam and Reservoir are located within the Beaverhead Mountains Ecoregion which extends from the Centennial Mountains south of Red Rock Lakes National Wildlife Refuge in southwestern Montana, west to the Continental Divide along the Beaverhead Mountains, and includes the headwaters for the Beaverhead, Madison, Big Hole rivers (Lesica 2003). Below the subalpine zone, Douglas fir (*Pseudotsuga menziesii*) is the principal coniferous species west of the Continental Divide. Lodgepole pine (*Pinus contorta*) and seasonal grasses dominate the basins and ranges of the eastern and southeastern part of the province. The lower slopes of the mountains and basal plains are dominated by sagebrush steppe.

Shrub steppe is the prevalent vegetation in the Clark Canyon Reservoir area. Big sagebrush (*Artemisia tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) are common shrubs. Rocky areas support mountain mahogany (*Cercocarpus ledifolius*) and broom snakeweed (*Gutierrezia sarothrae*). Perennial bunchgrasses such as bluebunch wheatgrass (*Agropyron spicatum*), fescue (*Festuca* sp.), and Indian ricegrass (*Oryzopis hymenoides*) occupy the understory alongside drought adapted forbs. The Beaverhead River supports a narrow riparian corridor and diversity of wetland plants along the river bottom. Common species within the river bottom near Clark Canyon Dam include baltic rush (*Juncus balticus*), smooth scouring rush (*Equisetum laevigatum*) and clustered field sedge (*Carex praegracilis*; MNHP 2004a).

The proposed powerhouse site, at the base of Clark Canyon Dam, is characterized by low to mid-height grasses and forbs. The proposed transmission line will extend over less than 530 feet of similar vegetation. This line will tie in with existing transmission poles (which will require upgrading) that continue through riparian and upland steppe vegetation for approximately 11 miles.

<u>3.3.1.1 Species of Concern</u>

Southwest Montana has a larger number of endemic and globally rare vascular plant species than any other part of the state. The majority of these species occur at mid-elevations and on lands administered by the BLM (Lesica et al. 1984). The MNHP lists 81 plant species within Beaverhead County at a state rank of 1 or 2 (high risk, or at risk of extirpation from Montana; Table 3-5). An additional five species are listed with a state rank of 3, or historic records from the state and are managed as sensitive or watch species by the BLM or the USFS. Of these species, one is protected under the federal Endangered Species Act: Ute ladies' tresses (*Spiranthes diluvialis*; Table 3-5).

Three plant species tracked by the MNHP occur within 1 mile of Clark Canyon Dam (Table 3-5; Figure 3-5). These include one BLM watch species and one species managed as sensitive by the BLM and USFS. No plant species protected under the Endangered Species Act

Table 3-5. Special status plant species known from Beaverhead County, Montana (MNHP 2004a).

Scientific Name	Common name	State Rank	STATUS ESA	STATUS USFS	STATUS BLM	within 1 mi	not likely to occur
Agastache cusickii	Cusick's horsemint	S1		S	S		
Allium parvum	Small onion	S2		S	S		
Amaranthus californicus	California amaranth	S2					
Aquilegia formosa	Sitka columbine	S2					X
Arabis fecunda	Sapphire rockcress	S2		S	S		
Astragalus ceramicus var. *apus*	Painted milkvetch	S1			S		X
Astragalus convallarius	Lesser rushy milkvetch	S2			W		
Astragalus scaphoides	Bitterroot milkvetch	S2		S	S	X	
Astragalus terminalis	Railhead milkvetch	S2			S		
Atriplex truncata	Wedge-leaved saltbush	S1			W		
Balsamorhiza hookeri	Hooker's balsam-root	S1					
Balsamorhiza macrophylla	Large-leafed balsamroot	S1		S	W		
Braya humilis	Low braya	S1					X
Carex idahoa	Idaho sedge	S2			S		
Carex multicostata	Many-ribbed sedge	S1			W		
Carex norvegica ssp. *stevenii*	Steven's scandinavian sedge	S1					
Chrysothamnus parryi ssp. *montanus*	Parry's mountain rabbitbrush	S1					
Cryptantha fendleri	Fendler cat's-eye	S2			W		X
Downingia laeta	Great basin downingia	S1			W		X
Draba globosa	Round-fruited draba	S1			W		X
Draba ventosa	Wind river draba	S1					X
Drosera anglica	English sundew	S2		S	S		X
Elodea longivaginata	Long sheath waterweed	S2			W		X
Elymus flavescens	Sand wildrye	S1			S		X
Erigeron asperugineus	Idaho fleabane	S1		S	W		X
Erigeron formosissimus	Beautiful fleabane	S1			W		
Erigeron leiomerus	Smooth fleabane	S1					X
Erigeron linearis	Linear-leaf fleabane	S1					
Erigeron parryi	Parry's fleabane	S2					
Erigeron tener	Slender fleabane	S1					
Eriogonum caespitosum	Mat buckwheat	S1					

Table 3-5. Special status plant species known from Beaverhead County, Montana (MNHP 2004a).

Scientific Name	Common name	State Rank	STATUS			within 1 mi	not likely to occur
			ESA	USFS	BLM		
Eriogonum soliceps	Railroad canyon wild buckwheat	S2					
Eupatorium occidentale	Western boneset	S2		S	S		
Gentianopsis simplex	Hiker's gentian	S1		S	W		
Haplopappus macronema var. *macronema*	Discoid goldenweed	S1		S	S		X
Haplopappus nanus	Dwarf goldenweed	S1					
Hutchinsia procumbens	Hutchinsia	S1			W		
Ipomopsis congesta ssp. *crebrifolia*	Ballhead gilia	S2					
Juncus hallii	Hall's rush	S2		S	S		
Kobresia simpliciuscula	Simple kobresia	S2					X
Kochia americana	Red sage	S1					
Lesquerella paysonii	Payson bladderpod	S1		S	S		
Lesquerella pulchella	Beautiful bladderpod	S2		S	S		X
Lewisia pygmaea var. *nevadensis*	Nevada bitterroot	S1					
Lomatium attenuatum	Taper-tip desert-parsley	S2			S		
Lomatogonium rotatum	Felwort	S1		S	W		
Mimulus primuloides	Primrose monkeyflower	S2		S	S		
Oenothera pallida var. *idahoensis*	Pale evening-primrose	S1			S		X
Orogenia fusiformis	Tapered-root orogenia	S2		S	S		
Oxytropis parryi	Parry's crazyweed	S1					X
Pedicularis crenulata	Scallop-leaf lousewort	S1				X	
Penstemon lemhiensis	Lemhi beardtongue	S2		S	S		
Penstemon whippleanus	Whipple's beardtongue	S1			S		X
Phacelia incana	Hoary phacelia	S2			W	X	
Plagiobothrys leptocladus	Slender-branched popcorn-flower	S1			W		X
Potentilla plattensis	Platte cinquefoil	S1			W		
Primula alcalina	Alkali primrose	S1			W		X
Primula incana	Mealy primrose	S2			W		
Puccinellia lemmonii	Lemmon's alkaligrass	S1					

Table 3-5. Special status plant species known from Beaverhead County, Montana (MNHP 2004a).

Scientific Name	Common name	State Rank	STATUS			within 1 mi	not likely to occur
			ESA	USFS	BLM		
Ranunculus jovis	Jove's buttercup	S2		S	S		
Ribes triste	Swamp red currant	S1					X
Ribes velutinum	Desert goosebery	S1					X
Saxifraga apetala	Tiny swamp saxifrage	S2					
Saxifraga tempestiva	Storm saxifrage	S2		S	S		X
Scirpus cespitosus	Tufted club-rush	S2		S	S		
Selaginella selaginoides	low spike-moss	S2					
Sphaeralcea munroana	white-stemmed globe-mallow	S1					
Spiranthes diluvialis	Ute ladies' tresses	S2	LT		W		
Stellaria crassifolia	fleshy stitchwort	S1			W		
Stellaria jamesiana	James stitchwort	S1			W		X
Stephanomeria spinosa	spiny skeletonweed	S1			W		
Stipa lettermanii	Letterman's needlegrass	S1					
Taraxacum eriophorum	Rocky Mountain dandelion	S2			S		
Thalictrum alpinum	alpine meadowrue	S2		S	S		
Thelypodium sagittatum ssp. *sagittatum*	slender thelypody	S2					
Thlaspi parviflorum	small-flowered pennycress	S2					
Townsendia condensata	cushion townsendia	S1S2			W		X
Townsendia florifer	showy townsendia	S1			W		
Viguiera multiflora	many-flowered viguiera	S1					
Phacelia scopulina	dwarf phacelia	SH			W		
Allotropa virgata	candystick	S3		S	S		X
Sphaeromeria argentea	chicken sage	S3			S		
Cryptantha humilis	round-headed cryptantha	SH			W		
Thelypodium paniculatum	northwestern thelypody	SH			S		

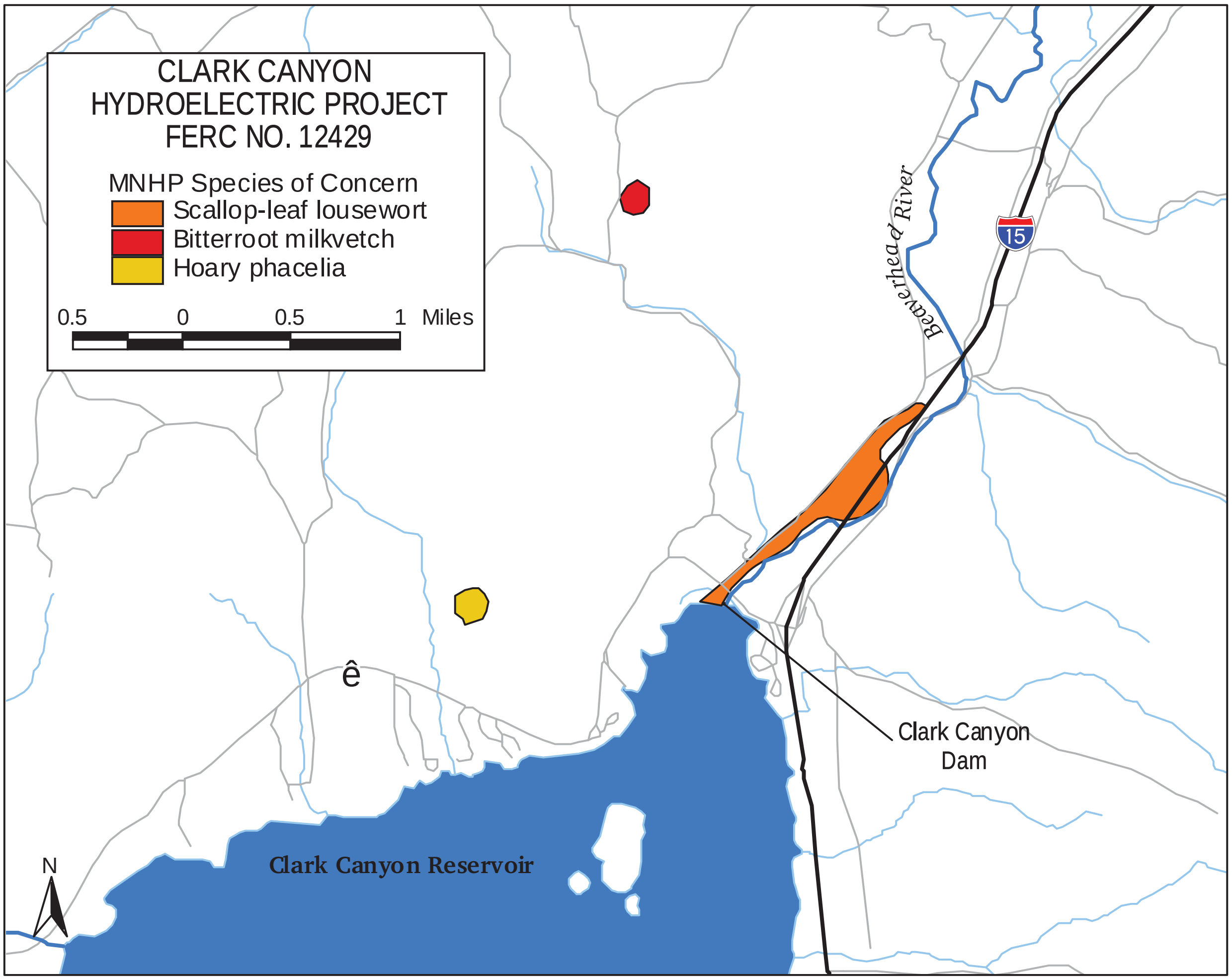


Figure 3-5. Map showing the locations of hoary phacelia, bitterroot milkvetch, and scallop-leaf lousewort.

ESA are recorded within 1 mile of the dam site. Several sensitive plants have potential habitat in the project area; others, known from Beaverhead County, are not likely to be found in project habitats (Table 3-5). Brief descriptions follow for those species recorded within 1 mile of Clark Canyon Dam.

Hoary phacelia

Hoary phacelia is managed as a watch species by the BLM and is considered at risk of extirpation by the MNHP. This annual forb is found in Utah, Idaho, Wyoming, and Montana. Only ten populations are known within Montana, all occur in Beaverhead County (MNHP 2004b). One population of hoary phacelia was discovered in 1995 within a mile of Clark Canyon Dam. The population occurs southwest of the dam, approximately 0.75 miles north of the reservoir shoreline (Figure 3-5; MNHP 2004a).

Hoary phacelia is a small annual forb up to 4 inches in height, with spreading glandular hairs along its foliage. White to blueish flowers are borne on a one-sided spike that unwinds as it matures from June through July. Hoary phacelia is short-lived and produces many seeds (MNHP 2004b).

Habitat for this species consists of stony, limestone-derived soils along talus slopes. Common associates include mountain mahogany and scattered forbs such as mountain tansymustard (*Descurainia richardsonii*), small-flowered blue-eyed Mary (*Collinsia parviflora*), and Watson's cryptanth (*Cryptantha watsonii*). Threats to hoary phacelia include exotic annual weeds. Anthropogenic habitat disturbance does not appear to be a threat (MNHP 2004b).

Bitterroot milkvetch

Bitterroot milkvetch is managed as sensitive by the BLM and USFS and is considered a species at risk by MNHP. This herbaceous perennial is endemic to Lemhi County, Idaho and Beaverhead County, Montana. Within Beaverhead County, bitterroot milkvetch is known from several sites extending from the Grasshopper Creek Drainage to the Tendoy Mountains. The total area occupied by this milkvetch may be less than 700 acres, although the number of plants is estimated in the tens of thousands (MNHP 2004b). One population of Bitterroot milkvetch, consisting of more than 50 plants, was identified in 1995 north of Clark Canyon Dam (MNHP 2004a; Figure 3-5).

Bitterroot milkvetch is a substantial perennial with several stems, 8 to 24 inches in height. Leaves are pinnately compound and the foliage is glabrous to sparsely hairy. Yellowish flowers are borne in the upper leaf axils from late May through early June. The fruit consists of oblong, green to reddish stalked pods held nearly erect at maturity (MNHP 2004b).

Habitat for bitterroot milkvetch is found on sagebrush grasslands with silty soils. Populations are frequently found between drainage bottoms and rocky upper slopes on warmer south to southwest facing aspects. Ground cover is often low in these habitats. Common shrub associates include big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*) and black sagebrush (*Artemisia nova*). Bluebunch wheatgrass (*Agropyron spicatum*), bluestem wheatgrass (*Agropyron smithii*), needle and thread grass (*Stipa comata*), and Indian ricegrass (*Oryzopsis hymenoides*) are common associated grasses. Threats to Bitterroot milkvetch include road development and grazing. The plant is most sensitive to grazing disturbance from May 15 through July 15 while flowers and fruit mature (MNHP 2004b).

Scallop-leaf lousewort

Scallop-leaf lousewort is considered at high risk of extirpation from Montana (MNHP 2004b). This species was discovered in Montana recently (summer 2003), such that agencies have yet to assign it a management designation (MNHP 2004a). Scallop-leaf lousewort is found primarily in southern Wyoming, Colorado and adjacent Nebraska. Nevada and California harbor disjunct populations that are of conservation concern. Two populations of scallop-leaf lousewort were discovered in 2003 along the Beaverhead River. These populations are over 300 miles northwest of the nearest known populations in Wyoming (Lesica 2003). One population is located immediately downstream of Clark Canyon Dam (MNHP 2004a).

Scallop-leaf lousewort is an herbaceous, perennial forb that produces multiple, bright purple flowers from late June through July. The species is known from wetland and river bottom areas. Along the Beaverhead River it is found in full sun on moist clay or peat soils derived from alluvium. Associates within wet riparian meadows include baltic rush, smooth scouring-rush, clustered field-sedge, western aster (*Aster occidentalis*), common silverweed (*Potentilla anserina*), and alkali plantain (*Plantago eriopoda*; MNHP 2004a).

3.3.1.2 Weed Species

Several weed species have potential to be problematic in the project area. Montana listed noxious weeds are shown in Table 3-6. Category 1 species are capable of rapid spread and render land unfit or greatly limit beneficial uses. Management criteria include awareness and education, containment and suppression of existing infestations and prevention of new infestations. Category 2 species have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion, rendering lands unfit for beneficial uses. Management criteria include awareness and education, monitoring and containment of known infestations and eradication where possible. Category 3 species weeds have either not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria include awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses. Management criteria for Watch species include awareness, early detection, monitoring, and containment of existing infestations. These weeds are known pests in adjacent states or provinces and may be capable of rapid spread. Other potentially problematic species will be identified in

Table 3-6. Montana state listed noxious weeds.

Scientific Name	Common Name	Noxious Weed List
Cirsium arvense	Canada thistle	category 1
Convuvulus arvensis	field bindweed	category 1
Cardaria draba	whitetop	category 1
Euphorbia esula	leafy spurge	category 1
Centaurea repens	Russian knapweed	category 1
Centaurea maculosa	spotted knapweed	category 1
Centaurea diffusa	diffuse knapweed	category 1
Linaria dalmatica	dalmatian toadflax	category 1
Hypericum perforatum	St. John's-wort	category 1
Potentilla recta	sulfur cinquefoil	category 1
Tanacetum vulgare	common tansy	category 1
Chrysanthemum leucanthemum	ox-eye daisy	category 1
Cynoglossum officinale	houndstongue	category 1
Isatis tinctoria	dyers woad	category 2
Lythrum salicaria	purple loosetrife	category 2
Lythrum virgatum	purple loosetrife	category 2
Senecio jacobea	tansy ragwort	category 2
Hieracium pratense	meadow hawkweed	category 2
Hieracium floribundum	meadow hawkweed	category 2
Hieracium piloselloides	meadow hawkweed	category 2
Hieracium aurantiacum	orange hawkweed	category 2
Ranunculus acris	tall buttercup	category 2
Tamarix sp.	tamarisk	category 2
Centaurea solstitialis	yellow star-thistle	category 3
Crupina vulgaris	common crupina	category 3
Chondrilla juncea	rush skeletonweed	category 3
Matricaria maritime var. *agrestis*	scentless chamomile	watch
Bryonia alba	white bryony	watch

coordination with BLM botanists. All project areas where ground disturbance may occur will be searched for weeds. Surveys will occur in conjunction with vegetation characterization and sensitive plant surveys. All weed infestations will be mapped and described.

3.3.2 Potential Project Effects

3.3.2.1 Vegetation Communities

Modification of Clark Canyon Dam to accommodate hydropower is not likely to have long-term effects on native plant communities. The power house, associated transformer pad and parking area will be placed between the spillway stilling basin and the outlet stilling basin, and will displace 2,400 square feet of previously disturbed steppe vegetation. An associated valvehouse located above the outlet basin will occupy 450 square feet. One 300-foot long access road will be built to access the facility. Structures within this existing right-of-way will be upgraded to carry power from the dam approximately 11 miles to the substation. Upgrading the poles in the transmission corridor to accommodate additional lines may temporarily disturb right-of-way vegetation. More significant effects could occur through disturbance to soils during construction activity. Such disturbance may allow noxious weeds to expand coverage in the area unless appropriate reseeding and weed control measures are implemented. A map for the new access road and transmission line is included in Exhibit F of this Final License Application.

3.3.2.2 Species of Concern

No species with protection under the federal Endangered Species Act are known to occur in habitats that may be effected by the project. Appropriate habitat for Ute ladies' tresses, a species listed as threatened under the ESA, could occur within the project area. No records of Ute ladies' tresses are known within a mile of Clark Canyon Dam.

Based on MNHP records, scallop-leaf lousewort (MNHP list 1) has potential to be effected by project construction. This species may occur at, or in the immediate vicinity of, the proposed powerhouse site. Construction activity may disturb this population. Project structures may remove occupied or potential habitat for scallop-leaf lousewort.

Suitable habitat for several other sensitive plants may occur in effected project areas (Table 3-5). Disturbance of soils or the introduction of invasive species may indirectly threaten plant species of concern. Without first hand knowledge of plant communities within areas to be disturbed, no assessment of project effects on individual species of concern is possible.

3.3.3 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. Comments related to vegetation resources were received from Montana Department of Fish, Wildlife and Parks wildlife Biologist, Craig W. Fager, submitted a letter in response to the Clark Canyon Dam Hydroelectric Project’s FSCD with comments specific to the project proposal as well as several general comments relating to wildlife and their habitats within the project area.

The MFWP sees very little potential for the project facility to negatively impact wildlife in the project area stating: “The footprint is too small to have significant impacts and the area is already disturbed from dam development and associated recreation. The project will not affect wildlife species or their habitat downstream in the Beaverhead River.”

The MFWP offered five, numbered comments pertaining to statements and data included in the FSCD with regard to botanical and wildlife resources. Two of those comments are specific to vegetation resources and they are summarized below.

> # 1) re: comments referenced to page 43; Section 6.1.1.1: a) remark that the document should state the project area “includes the headwaters for the Beaverhead, Madison and” <u>Big Hole</u> rivers and not the <u>Clarks Fork</u> river which was erroneously included in the document; b) Douglas fir is the principal coniferous species east of the Continental Divide and within the project area; and, c) grand fir does not occur in southwest Montana or southeast Idaho.

> # 2) re: comments referenced to page 43; Section 6.1.1.2: urged the cooperation of BLM range conservationist, Brian Hockett, as well as “local experts,” in an effort to “pare down” the resident species list down to “meaningful species that are likely to be present.”

3.3.4 Applicant Recommendations

In June of 1988, the Federal Energy Regulatory Commission (FERC) granted an "Order Issuing License" to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a “Finding Of No Significant Impact.” The project described within this Draft License Application is similarly proposed to create no significant impacts. Within the "Order Issuing License" document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures and supports the premiss behind the Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project. In addition, the Applicant will consult with the all resource agencies and other pertinent parties to address further resource concerns.

3.3.5 Final Agency Comments and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

4.0 CULTURAL RESOURCES

4.1 Existing Environment

This section will describe the historical cultural conditions in the vicinity of the proposed Clark Canyon Dam hydroelectric project.

The immediate area within the vicinity of the proposed project was an important prehistoric and historic travel route. During the ethnographic period (Pre-European contact), the Clark Canyon watershed was occupied seasonally by the Lemhi-Shoshone Tribes. Lewis and Clark were the first Euro-Americans to pass through the Beaverhead Valley. On August 13, 1805 Lewis and Clark expedition made their first contact with Sacagawea's Shoshone Tribe at a location that is currently inundated by Clark Canyon Reservoir. The location was named "Camp Fortunate" due to the hospitality of the tribe and their willingness to trade for horses, a necessity for crossing the Rockies. Their expedition crossed the continental divide at Lemhi Pass on August 12, 1805. Approximately 208 acres in the vicinity of Lemhi Pass are designated as a registered historic landmark by the U.S. Department of the Interior.

In 1862, gold was discovered near the town of Bannack, Montana and caused the first wave of rapid Euro-American settlement in the area. At the height of the area's gold rush Bannack had a population of over 3,000 and was the first Montana territorial capital. The period was short lived though and old mining camps and ghost towns are all that remain.

In 1877, approximately 750 Nez Perce Native Americans fled north out of Idaho due to the demands of the US Army that they move onto a reservation. On August 9, 1877, the U.S. Army attacked the Nez Perce along the north fork of the Big Hole River. The Battle of Big Hole lasted less than 36 hours, but with significant casualties on both sides. In 1992, legislation incorporated Big Hole National Battlefield with Nez Perce National Historical Park.

The city of Dillon originated during the construction of the Utah and Northern Railroad. The city was the site of a construction camp during the winter of 1880. The railroad was pushing north towards Butte, but winter conditions halted any progress until the spring of 1881. When construction did resume in the spring the town remained. The city was named in honor of the president of the Union Pacific Railroad, Sidney Dillon.

4.2 Potential Project Effects

In order to fulfill the state and federal guidelines for cultural resources, The Applicant' has initiated consultation with the Montana State Historic Preservation Office (SHPO). This consultation is needed in order to establish an area of potential effect (APE) associated with the proposed hydroelectric project. Upon determination of the APE, an appropriate Cultural Resource Assessment Survey (CRAS) will be completed by a Montana SHPO approved contractor within the designated APE. All future cultural resource correspondence and documentation will be forwarded to FERC.

4.3 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. There were no responses to the FSCD with regard to cultural resources.

4.4 Applicant Recommendations

In June of 1988, the Federal Energy Regulatory Commission (FERC) granted an "Order Issuing License" to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a “Finding Of No Significant Impact.” The project described within this Draft License Application is similarly proposed to create no significant impacts. Within the "Order Issuing License" document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures and supports the premiss behind the Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project. In addition, The Applicant will consult with the all resource agencies and other pertinent parties to address further resource concerns.

4.5 Final Agency Comments and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

5.0 RECREATIONAL RESOURCES

5.1 Existing Environment

Clark Canyon Dam is a feature of the East Bench Unit of the Pick-Sloan Missouri Basin Program. Recreational opportunities on Clark Canyon Reservoir and the Beaverhead River south of Dillon, Montana, is managed by Reclamation. Recreational opportunities at the reservoir include boating, cultural/historic sites, camping, fishing, hiking, hunting, picnicking, recreational vehicles, water sports, and wildlife viewing. According to the Reclamation's Great Plains Region's Clark Canyon web site (USBR 2004), the reservoir, at full pool, has 4,935 surface acres and 17 miles of shoreline offering good fishing for rainbow and brown trout. There are several concrete boat ramps, picnic shelters, and a marina, along with nine campground sites including one for RVs-only for a total of 96 campsites. The Cattail Marsh nature trail offers wildlife watching opportunities for seasonal waterfowl (USBR 2004). Written comments form MFWP staff note that "the marina and all but one of the boat ramps have not been serviceable over the recent past due to chronic low reservoir pools" (MFWP 2005).

The reservoir is noted for its excellent fishing opportunities for rainbow trout. The reservoir has been stocked "only with the wild Eagle Lake strain of rainbow trout since 1993. Prior to that over the 1980-1992 period, a strain evaluation of performance at Clark Canyon Reservoir also included the fast growing domestic Arlee strain and wild DeSmet strain of rainbow trout" (MFWP 2005). Use of the reservoir is quite high with heavy use from personal watercraft, water-skiers and pleasure boaters as well as fairly heavy use from fisherman due to the high quality of the fishing.

The Beaverhead River originally formed at the confluence of Red Rock River and Horse Prairie Creek but now begins its 69-mile-long journey at the outlet of Clark Canyon Reservoir. It joins the Big Hole River at Twin Bridges, Montana, to form the Jefferson River. Above Dillon, the river is described as a tight channel that meanders through densely vegetated banks. Below Dillon, heavy irrigation use constrains the river to very slow flows through predominantly private land (MFWP 2004).

The river immediately below the dam is lauded as one of the premier brown trout fishing destinations in Montana, yielding more large trout, especially brown trout, than any other river in Montana (Big Sky Fishing.Com, 2004). Additional game fishing species include burbot, and rainbow trout. Fish cover is primarily submerged and overhanging bank vegetation, undercuts and long, deep pools.

Reclamation is currently responsible for management of the recreational resources in the reservoir and the area immediately downstream of the dam (FERC 1988a).

5.1.1 Federal Lakes Recreation Demonstration Program

Clark Canyon Reservoir has been selected as part of a Federal Lakes Recreation Demonstration Program. As described in an interagency status report dated November 7, 2001, the Description of Purpose, Objectives and Goals of the program are as follows:

"The purpose of this demonstration program is to identify the current status and future needs of recreational opportunities at Clark Canyon Reservoir. A Resource Management Plan (RMP) will be developed to identify significant improvements needed at the reservoir. The RMP will also be used to attract a potential managing partner prior to the anticipated increase in visitation related to the Lewis and Clark bicentennial in 2004-2006 (USBR 2004).

According to Reclamation contact, Jeff Baumberger of Reclamation’s Montana Area Office, the Clark Canyon RMP was completed in the fall of 2005. The RMP is a 10-year land and recreation planning document that will assist managers with the future land and recreational demands for Clark Canyon Reservoir and adjacent lands. The interagency status report states that “the RMP will be an all-inclusive planning document to assist manages with the future recreational demands in preparation of the Lewis and Clark bicentennial celebration.”

5.1.2 Drought Conditions

In response to severe drought conditions, Reclamation's Montana office issued a news release in June of 2004. According to Jamie Macartney, Acting Area Manager for Reclamation's Montana Area Office, drought conditions will continue to effect irrigation, power, and recreational water users throughout much of Montana. The following is an excerpt from the announcement:

“The Beaverhead watershed in southwestern Montana continues to be the most critically impacted drought area in Montana. Clark Canyon Reservoir has not filled to the top of the conservation pool (178,000 acre-feet) since 1998.

“Inflows to Clark Canyon continue to set new record lows and are currently at 75 cubic feet per second (cfs), which is about 12 percent of normal for this time of year.

“Reservoir storage has peaked for the year at 55,371 acre-feet. This is the lowest peak storage at Clark Canyon Reservoir since construction of the dam in 1965. As a result, no water will be delivered to the East Bench Irrigation District in 2004.

“Lake recreation will be severely impacted as there will be no concessionaire at Clark Canyon Reservoir and only one boat ramp is usable at this time” (USBR 2004).

The Applicant is keenly aware of the drought conditions throughout the region and will consult with the appropriate resource agencies with regards to any possible drought-related impacts which may arise as a result of the proposed hydroelectric project's features.

5.2 Potential Project Effects

The development of a hydroelectric plant at Clark Canyon Dam would not directly affect recreation around the reservoir or below the dam. However, the construction of a powerhouse and new transmission lines may have potential project effects to visual resources. However, given the close proximity of U.S. Highway 15, as well as the previously altered landscape from the dam construction and its appurtenant features, the proposed upgrades to the project will be minimal. The Applicant will work with relevant resource agencies to develop and implement visual resource plans to help offset any visual impacts to existing project features. In addition, the Applicant will utilize the relevant comprehensive management plans to assure all new features of the proposed hydroelectric project meet established visual quality objectives.

5.3 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. The Montana Fish, Wildlife and Parks Area Fisheries Management Biologist, Richard Oswald, submitted “several general comments pertinent to the project proposal and its potential to affect fisheries resources and habitats in the Beaverhead River;” as well as “a number of comments specific to assumptions and statements in the document.” A summary of the comments are provided below.

In their letter, dated January 10, 2005, the MFWP does not view the proposed project as a new or additional threat to fisheries of fish habitat with the caveat “that power generation would only occur within normal irrigation or flood control release and storage regimes. They also submit that the project could benefit:

1) fish habitat in the river - if accompanied by an increase in minimum instream flow release;

2) reservoir fisheries and recreation - with the incorporation of minimum reservoir storage pool not associated with irrigation; and,

3) fisheries - if outlet releases through the turbines eliminated or substantially reduced gas supersaturation at the outlet works.

22) re: comments referenced to page 68; Section 8.1.1: remark that the marina and all but one of the boat ramps have not been serviceable recently due to chronic low reservoir pool.

23) re: comments referenced to page 68; Section 8.1.2: a) remark that Clark Canyon Reservoir has only been stocked with wild Eagle Lake strain of rainbow trout since 1993; b) during 1980 to 1992, a strain evaluation of performance at Clark Canyon Reservoir also included the fast-growing, domestic DeSmart strain of rainbow trout.

24) re: comments referenced to page 69; Section 8.2.2: remark suggesting section should be “retitled.”

25) re: comments referenced to page 70; Section 8.3: remark that development and operation of a hydroelectric facility at Clark Canyon Reservoir could directly affect and improve recreational activity if accompanied by a sufficient minimum reservoir pool and improved minimum instream flow in the river.

5.4 Applicant Recommendations

In June of 1988, the FERC granted an “Order Issuing License” to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a “Finding Of No Significant Impact.” The project described within this Draft License Application is similarly proposed to create no significant impacts. Within the “Order Issuing License” document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures and supports the premiss behind the Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project. In addition, the Applicant will consult with the all resource agencies and other pertinent parties to address further resource concerns.

5.5 Final Agency Consultation and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

6.0 VISUAL RESOURCES

6.1 Existing Environment

The Clark Canyon Dam and Reservoir presents a relatively natural appearance in a broad, open valley of rolling landscape, with low vegetation cover of grasses, shrubs with a few patches of taller, thicker vegetation. It is a dominant landscape feature that is quite visible to motorists traveling on Interstate Highway 15 and is very visible from adjacent lands. Dominant features include the dam structure, Armstead Island and a small number recreation facilities. Wildlife viewing areas include a developed bird watching trail, as well as the delta areas near the mouths of Horse Prairie Creek and Red Rock River. A short section of the Beaverhead River downstream of the dam, between the I-15 bridge at Pipe Organ Rock and the “Dalys” exit of the highway, has been evaluated for eligibility as a “Recreation” classification of the Wild and Scenic River Act and is considered “outstandingly remarkable” for recreation, fish and historic values. This section of the river is not within the project area or Reclamation jurisdiction.

6.2 Potential Project Effects

There are no potential project effects to visual resources. However, as previously noted in Section 5.2, the construction of a powerhouse and new transmission lines may have potential project effects to visual resources. However, given the close proximity of U.S. Highway 15, as well as the previously altered landscape from the dam construction and its appurtenant features, the proposed upgrades to the project will be minimal. The Applicant will work with relevant resource agencies to develop and implement visual resource plans to help offset any visual impacts to existing project features. In addition, the Applicant will utilize the relevant comprehensive management plans to assure all new features of the proposed hydroelectric project meet established visual quality objectives.

6.3 Agency Consultation

Agency consultation began with the issuance of the First Stage Consultation Document in December 2004 to all relevant resource agencies, watershed stakeholders and interested individuals. There were no responses to the FSCD with regard to visual resources.

6.4 Applicant Recommendations

In June of 1988, the Federal Energy Regulatory Commission (FERC) granted an "Order Issuing License" to the East Bench Irrigation District but the project (FERC project # P-7664) was not completed due to certain extenuating circumstances. An Environmental Assessment was completed on May 23, 1988 as part of the previous license including a “Finding Of No Significant Impact.” The project described within this Draft License Application is similarly proposed to create no significant impacts. Within the "Order Issuing License" document, FERC prescribed a number of Articles designed to protect the project's various resources. The Applicant is committed to these previously issued measures and supports the premiss behind the

Articles and will provide for their full implementation should a FERC license be granted to the currently proposed project. In addition, the Applicant will consult with the all resource agencies and other pertinent parties to address further resource concerns.

6.5 Final Agency Comments and Applicant Recommendations

The Draft License Application was issued to resource agencies in March 2006. Four comments were received in response. Comments requesting specific changes have been incorporated into this Final License Application. Specific responses to these comments can be found in Section E-3 of the Exhibit E.

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APPENDIX C
Vegetation Characterization and Sensitive Plant Surveys

Vegetation Characterization and Surveys for Sensitive Plants

Clark Canyon Dam
Hydroelectric Project
FERC # 12429

June 2007

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Tables

Figures

1.0 Introduction

Clark Canyon Dam and Reservoir are located within the Middle Rockies Ecoregion at a boundary between the Intermontane Sagebrush Valleys subregion to the south and the Dry Gneissic-Schistose-Volcanic Hills subregion to the north (Woods et. al. 2002). Both subregions support sagebrush steppe and semi arid grassland communities. The Dry Intermontane Sagebrush Valleys subregion consists of broad valleys from 4,500 to 8,600 feet with annual precipitation from 9 to16 inches and 70 to 110 frost-free days. The Dry Gneissic-Schistose-Volcanic Hills subregion occupies hills and alluvial fans from 4,800 to 9,600 feet in elevation and has a shorter growing season (up to 71 days) and greater precipitation. Both subregions provide livestock range and some mining; however land use is more intensive within the Intermontane Sagebrush Valleys subregion (Woods et. al. 2002).

Shrub steppe is the prevalent vegetation in the Clark Canyon Reservoir area. Big sagebrush (*Artemisia tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) are common shrubs. Rocky areas support mountain mahogany (*Cercocarpus ledifolius*) and broom snakeweed (*Gutierrezia sarothrae*). Perennial bunchgrasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), fescue (*Festuca sp.*), and indian ricegrass (*Oryzopis hymenoides*) occupy the understory alongside drought adapted forbs. The Beaverhead River supports a narrow riparian corridor and diversity of wetland plants along the river bottom. Common species within the river bottom near Clark Canyon Dam include baltic rush (*Juncus balticus*), smooth scouring rush (*Equisetum laevigatum*) and clustered field sedge (*Carex praegracilis*; MNHP 2004).

Clark Canyon Dam is an earth fill structure. Following construction in 1964, the dam was seeded in perennial grasses. Soil is minimally developed and gravelly; however this grass community continues to provide essential cover. Vegetation on the dam is actively managed to control noxious weeds and eliminate shrubs whose roots could compromise the integrity of the dam (East Bench Irrigation District Dam Manager, pers. comm. June 12, 2007). Recreation also affects vegetation at the base of the dam. The Beaverhead River is a popular fishing destination; access roads and associated vegetation disturbance approach the north and south banks of the tailrace. Developed parking, a primitive boat launch, and restrooms are located on the north banks of the tailrace. Notwithstanding recreation disturbance, robust riparian wetlands along the north banks of the tailrace harbor scallop-leaf lousewort (*Pedicularis crenulata*), a species critically imperiled in the state of Montana (S1 rank; MNHP 2004). From a regional perspective, maintaining natural vegetation communities is high priority because of their contribution to the aesthetics of recreational experience and the proximity of sensitive species such as scallop-leaf lousewort.

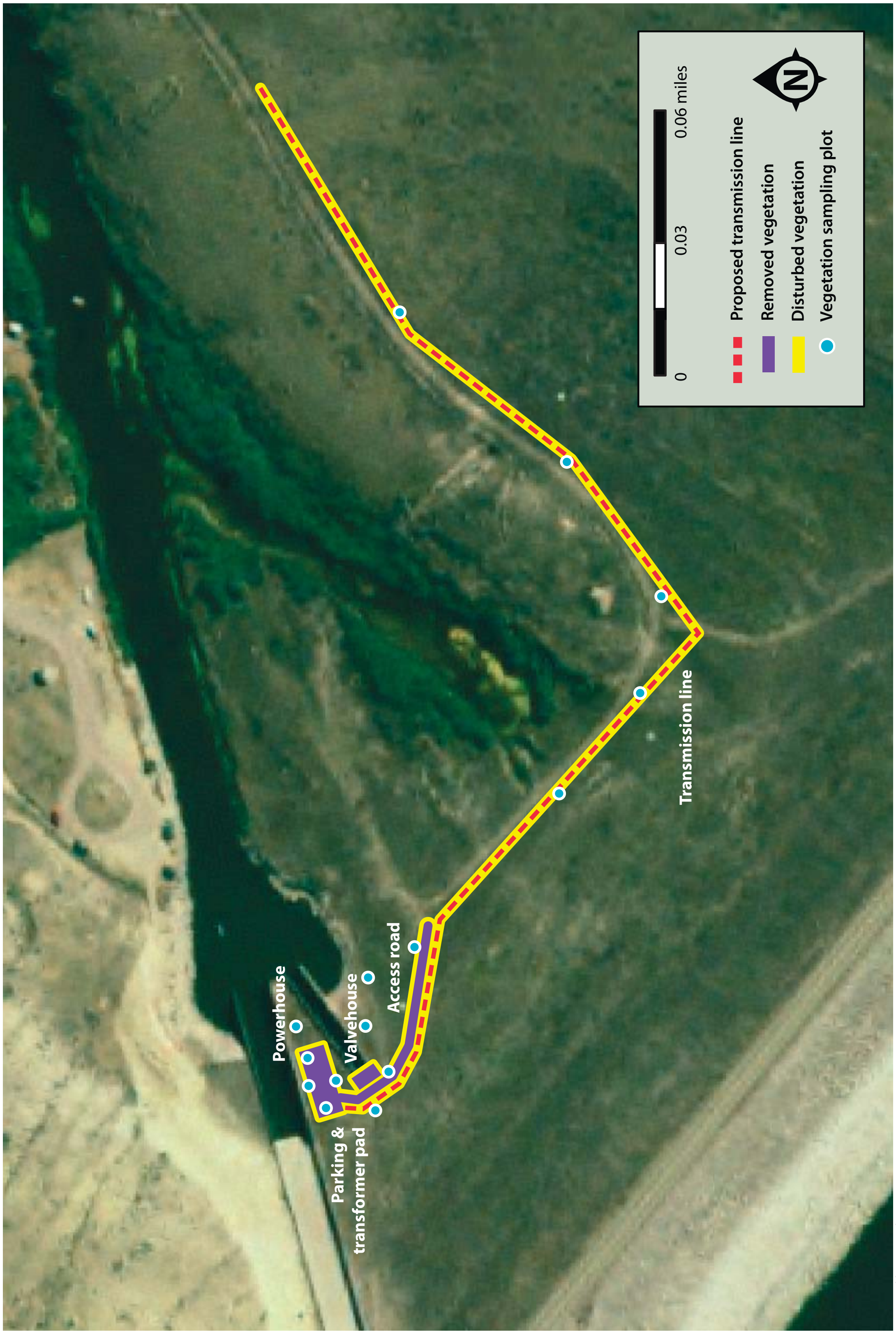
The Clark Canyon Dam Hydroelectric Project (FERC #12429) proposes to retrofit Clark Canyon Dam with the facilities necessary to generate hydroelectric power. Such facilities include a powerhouse, parking area and transformer pad located on the face of Clark Canyon Dam between the spillway and outlet structures. A valvehouse will be located at the southwest tip of the outlet structure, and a 12 foot-wide powerhouse access road will extend from the powerhouse, 244 feet to an existing access road immediately east of the dam outlet. A transmission cable will be buried along the south side of the access road for 1,342 feet and will tie into existing transmission lines at this point (Fig. 1). In total, 0.13 acres of vegetation will be removed and 0.24 acres will be disturbed during construction (Table 1).

To adequately determine the effects of the project on vegetation, surveys were conducted with the following objectives: (1) to provide baseline information to aid in plant community restoration (2) to locate plant species of concern within potentially disturbed areas (3) to identify the location and extent of noxious weed infestations.

Table 1. Anticipated vegetation disturbance.

Project Feature	Vegetation Removed (ft^2)	Vegetation Disturbed[1] (ft^2)
Powerhouse	1,500	780
Parking and Transformer Pad	900	540
Valvehouse	464	558
Access Road	2,928	732
Transmission Line	0	8,052
Total Affected Area (ft^2)	**5,792**	**10,662**
Total Affected Area (acres)	**0.13**	**0.24**

[1]Vegetation disturbed includes a six foot buffer around project structures, a three foot buffer along the new access road, and a six foot swath along the transmission line corridor.



prepared by: N. Nielson

source: 2005 NAIP photo, NPSI project drawing

Figure 1. Project location and affected area.

2.0 Methods

Prior to visiting the project site we searched the Montana Natural Heritage Program plant records to determine which special status plant species occur in the region. For the purposes of this study sensitive plants are: 1) those with an MNHP conservation ranking of one or two that are known from Beaverhead County; and 2) plants with conservation priority under Bureau of Land Management or Beaverhead National Forest designations known from Beaverhead County. The habitat requirements for each sensitive species were reviewed, and the list was narrowed to three target species based on the recommendation of BLM rangeland management specialist Brian Hockett (Table 2). Photographs and descriptions of these sensitive species were examined and the state list of noxious weeds was reviewed prior to the site visit.

M. Nielson lead the vegetation characterization, survey for sensitive plants, and inventory of noxious weeds on June 12, 2007. Fifteen one-meter radius sampling plots were established representatively throughout the site (Fig. 1). We estimated the aerial cover of each species within established plots to quantify plant species composition, relative abundance, and horizontal structure. To facilitate consistency among observers, cover was estimated using Daubenmire's cover classes. For each plant species, frequency represents the number of plots it occurred in, cover represents the average aerial cover over all plots, relative cover represents the average of the total ground cover contributed by that species, and local abundance is reported as the relative cover divided by the frequency. Vertical structure was described using a vegetation profile board centered in each plot and observed from a distance of 50 feet. Photographs were taken at each plot for visual reference.

Sensitive plant surveys were conducted in accordance with guidelines established by the U.S. Fish and Wildlife Service (USFWS 1996). We visited all potentially affected project areas including: 1) areas where construction equipment will operate; 2) areas potentially disturbed by the placement of transmission line; and 3) areas where vegetation will be removed for project structures. Visits to each area included walking through and around the site and identifying habitats within the area where rare plant species are likely to occur, and intensively examining those areas likely to support sensitive plant species. During this search we mapped and described noxious weed occurrences and noted any plant species that were not included in sampling plots. All routes walked and areas intensively examined were documented on maps.

Table 2. Sensitive plant species potentially occurring in the project area.

Scientifitic Name	Common Name	Habitats	State Conservation Rank	Federal Status
Astragalus scaphoides	Bitterroot milkvetch	sagebrush steppe	S2	USFS and BLM Sensitive
Pedicularis crenulata	Scallop-leaf lousewort	ripairan meadows	S1	BLM Sensitive
Phacelia incana	Hoary phacelia	talus slopes	S2	BLM Watch

3.0 Results

3.1 Plant Communities

Two general plant communities are present within the project area. The first community occupies the face of the dam, runs between the concrete spillway and outlet works, and extends 50 to 100 feet from the base of the dam. Gravelly dam fill material provides substrate in these areas and vegetation is actively controlled to eliminate shrubs. Perennial grasses, seeded following dam construction, are the dominant species throughout this area. Crested wheatgrass (*Agropyron cristatum*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and blue wildrye (*Elymus glaucus*) are the most common grasses (Fig. 2). The proposed powerhouse, parking area, valvehouse, access road, and the initial 700 feet of the transmission line will disturb/displace this community (Fig. 3; Fig. 4).

Figure 2. Perennial grass community characteristic of the dam face. Crested wheatgrass and blue wildrye are the dominant grasses in the photograph. Alfalfa is visible to the left in the foreground.

Figure 3. Proposed powerhouse site. Bluebunch wheatgrass and crested wheatgrass are the dominant grasses visible in this photograph.

Figure 4. Proposed transmission line corridor. Transmission line will be buried on the south and east side of the existing access road (left in the photograph). Blue wildrye and crested wheatgrass are the dominant grasses visible in the photo.

The second community extends along the existing access road where the final 600 feet of transmission line will be buried. Perennial grasses continue to form a primary component within this community; however a shrub element and a greater variety of native forbs are also present. Basin big sagebrush (*Artemisia tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) are common, although they do not form an extensive canopy. Pasture sagebrush (*Artemisia frigida*) is widespread as a groundcover in this area, and native forbs such as paintbrush (*Castilleja sp*.), pussytoes (*Antennaria racemosa*), and Howell's milkwetch (*Astragalus howellii*) are present.

Figure 5. Open sagebrush steppe community characteristic of the final 600 ft. of the transmission line corridor. Basin big sagebrush is the dominant blue-green shrub visible in the photograph; the smaller shrub is green rabbitbrush. Crested wheatgrass is the most common grass in the foreground.

We did not characterize plant communities outside of the area of direct project impacts; however it is important to note that a wetland complex associated with the original river channel is present approximately 25 feet northeast of the existing access road. Seepage from the dam and inputs from the adjacent Beaverhead River contribute to this wetland. The wetland occurs on the opposite side of the road from where the transmission line will be buried and is outside of the project footprint; however the wetland is within the project area and will need to be protected.

Figure 6. Wetland seep, part of the original river channel, located immediately outside of the project footprint, but within the project area. Photograph was taken from the existing access road toward the northeast.

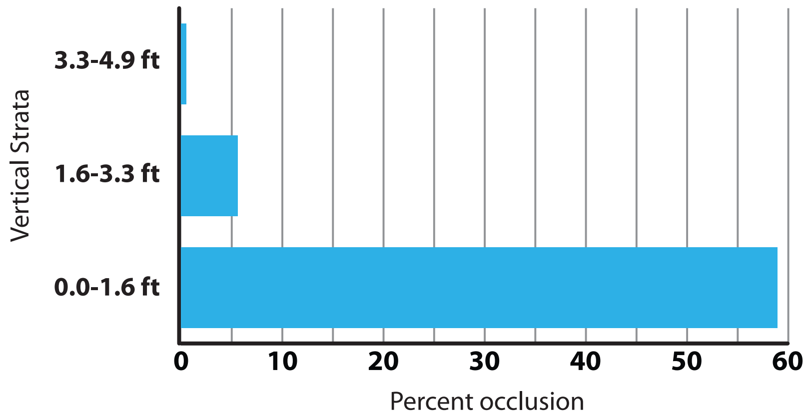
3.2 Vegetation Structure

Although canopy cover does not reach 100 percent, erosion is not apparent within either plant community. A lichen crust stabilizes most areas of bare soil and, in general, where lichen is absent an embedded pebble and gravel "pavement" has developed. The mean height of herbaceous vegetation is just under two feet; as a result of shrub control activities, sagebrush and rabbitbrush average just over one foot tall (Table 3). Perennial grasses dominate vertical cover; cover is relatively dense in the first 1.5 feet and declines dramatically in the subsequent two cover blocks, consistent with the average height of grasses in the project area (Fig. 6).

Table 3. Average total aerial cover and height of vegetation.

	Aerial Cover (%)	Height (ft)
Herbs & Graminoids	82	1.83
Shrubs	4	1.21

Figure 7. Cover in each of the vertical structure categories averaged over all plots. Bars represent percent occlusion of a 1.64 feet square held at plot center and viewed from 50 feet away, category one represents the lowest square held on ground level.



3.3 Invasive Species

A total of 33 grass and forb species and three shrub species were identified within the project area. Of these, 20 herbaceous species and all shrub species are native (Table 4). Introduced grasses include pasture grasses such as crested wheatgrass (*Agropyron cristatum*) and Kentucky bluegrass (*Poa pratensis*), and invasive grasses such as cheatgrass (*Bromus tectorum*) and quackgrass (*Agropyron repens*). Cheatgrass forms a minor component of vegetation in both community types, and in the presence of robust perennial cover, is expected to remain at low levels. Quackgrass is found occasionally within moist microsites; based on arid conditions in the project area it is not expected to expand its cover appreciably.

Eight of 20 identified forbs are non-native and generally considered weeds, although only spotted knapweed (*Centaurea maculosa*) is a state listed noxious weed. The most common weedy forb was yellow salsify (*Tragopogon dubius*), followed by sow thistle (*Sonchus arvensis*). One-third of plots surveyed contained one or both of these species; however cover by both remains low (Table 4).

The East Bench Irrigation District actively manages the dam to suppress noxious weeds. Spotted knapweed occurred as a single plant within three plots. Two plots were located within the area proposed for the new access road and one was located within the transmission line corridor. An additional infestation of five to ten plants was identified between the proposed new access road and the existing outlet structure, near where the outlet structure enters the tailrace.

Table 4. Vascular plant species identified within the project area.

scientific name	common name	frequency	cover (%)	relative cover (%)	local abundance	origin
FORBS and GRAMINOIDS						
Agropyrom cristatum	crested wheatgrass	0.73	18.0	22.8	31.1	non-native
Pseudoroegneria spicata	bluebunch wheatgrass	0.53	21.0	27.6	51.8	native
Elymus glaucus	blue wildrye	0.47	15.6	18.0	38.6	native
Poa scabrella	pine bluegrass	0.47	5.0	6.8	14.5	native
Bromus tectorum	cheatgrass	0.40	2.7	3.8	9.5	non-native
Tragopogon dubius	salsify	0.33	0.6	0.7	2.1	non-native
Sonchus arvensis	sow thistle	0.33	0.2	0.2	0.6	non-native
Medicago sativa	alfalfa	0.27	3.2	4.2	15.7	non-native
Bromus inermis	smooth brome	0.20	9.3	10.3	51.5	native
Agropyron repens	quackgrass	0.20	1.1	1.0	4.8	non-native
Centaurea maculosa	spotted knapweed	0.20	0.5	0.6	3.2	non-native
Astragalus agrestis	field milkvetch	0.20	0.3	0.5	2.3	native
Poa pratensis	Kentucky bluegrass	0.13	1.2	1.2	9.1	non-native
Arabis holboellii	Holboell's rockcress	0.13	0.3	0.4	3.1	native
Aster sp.	aster	0.13	0.3	0.4	4.9	native
Grindellia squarrosa	curly-cup gumweed	0.13	0.3	0.4	2.6	native
Lesquerella kingii	King's bladderpod	0.13	0.3	0.2	1.9	native
Camelina microcarpa	littlepod falseflax	0.13	0.1	0.1	0.7	native
Carex praegracilis	clustered field sedge	0.07	0.2	0.4	5.7	native
Potentilla pensylvanica	prairie cinquefoil	0.07	0.0	0.1	0.8	native
Festuca idahoensis	Idaho fescue	0.07	0.0	0.0	0.7	native
Lepidium campestre	field pepperweed	0.07	0.0	0.0	0.7	non-native
Stipa comata	needleandthread	0.07	0.0	0.0	0.7	native
Melilotus officinalis	yellow sweet clover	0.07	0.0	0.0	0.6	non-native
Poa sp.	bluegrass	0.07	0.0	0.0	0.6	unk
Pyrrocoma lanceolata	lanceleaf goldenweed	0.07	0.0	0.0	0.6	native
Taraxacum officinale	dandelion	0.07	0.0	0.0	0.6	non-native
Astragalus howellii	Howell's milkvetch					native
Antennaria racemosa	pink pussytoes					native
Allium sp.	onion					native
Castilleja sp.	paintbrush					native
Descurainia sophia	flixweed					non-native
Koeleria macrantha	prairie junegrass					native
SHRUBS						
Artemisia frigida	pasture sagebrush	0.20	1.0	9.0	65.2	native
Artemisia tridentata	basin big sagebrush	0.40	0.8	27.9	69.7	native
Chrysothamnus viscidiflorus	green rabbitbrush	0.33	1.3	16.8	50.5	native

3.4 Sensitive Species

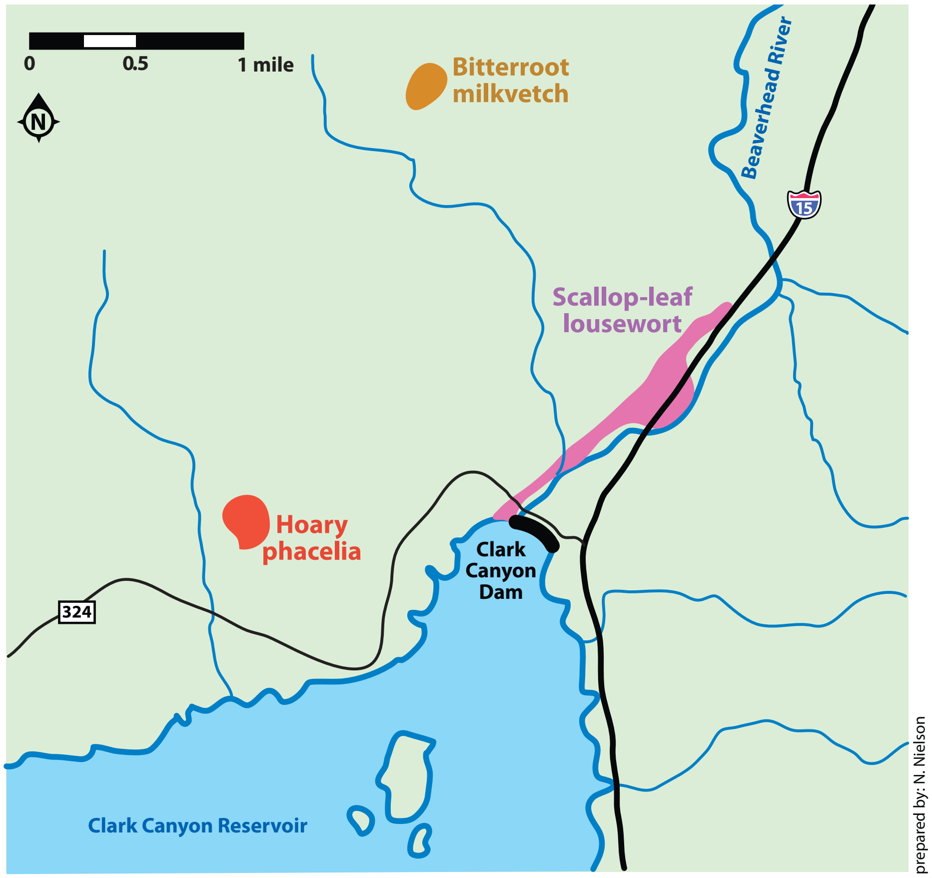
Potential habitats for two of the three target sensitive species were not found within the project area. Hoary phacelia (*Phacelia incana*) is known from talus slopes. Steep slopes occur near the proposed parking and transformer pad and new access road; however loose rock is absent, perennial grasses form 75 to 80 percent cover, and the area is treated with broadleaf herbicides regularly. Scallop-leaf lousewort inhabits wetland and river bottom areas. Along the Beaverhead River it is found in full sun on moist clay or peat soils derived from alluvium (MNHP 2004). Scallop-leaf lousewort is found within wetlands on the west banks of the tailrace; however all project ground disturbance will occur on the east side of the tailrace outside of the riparian corridor. A wetland complex associated with the original river channel is found approximately 25 feet from the access road on the west side of the tailrace. This wetland is outside of the area of ground disturbance, but within the project area.

Although it is listed as threatened under the federal Endangered Species Act and known from Beaverhead County, our surveys did not target Ute ladies' tresses (*Spiranthes diluvialis*). This species requires particular wetland hydrology, and no subirrigated riparian or wetland habitat occurs within affected project areas. In addition, Ute ladies' tresses has yet to be found this high in the Beaverhead River watershed (B. Hockett, pers. comm. April 2007).

Marginal potential habitat for Bitterroot milkvetch (*Astragalus scaphoides*) was encountered within the project area along the final 600 feet of the proposed transmission line corridor. This species is found in sagebrush grasslands with silty soils. Populations are frequently found between drainage bottoms and rocky upper slopes on warmer south to southwest facing aspects. Ground cover is often low in these habitats. Common shrub associates include big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*) and black sagebrush (*Artemisia nova*). Bluebunch wheatgrass (*Agropyron spicatum*), bluestem wheatgrass (*Pascopyrum smithii*), needleandthread grass (*Stipa comata*), and indian ricegrass (*Oryzopsis* hymenoides) are common associated grasses. One population of Bitterroot milkvetch, consisting of more than 50 plants, was identified in 1995 north of Clark Canyon Dam (MNHP 2004; Fig. 7).

The proposed transmission corridor was carefully searched and Bitterroot milkvetch was not encountered. Soils are gravelly in this area and the aspect is generally north to northwest; thus preferred habitat conditions are not apparent. Grazing is not allowed within the project area (or on any BOR lands downstream of Clark Canyon Dam), and accumulated precipitation in southwest Montana for the first five months of 2007 was 7.5 inches. This amount is 121 percent of average for the region (WRCC 2007); thus Bitterroot milkvetch does not appear to currently occur within affected areas.

Figure 8. Known occurrences of sensitive plants in the project vicinity (source MNHP 2004).



4.0 Project Impacts

The Clark Canyon Dam Hydroelectric Project will remove 0.13 acres of vegetation. All vegetation removal will occur within the perennial grass community that typifies the dam face. An additional 0.24 acres of vegetation will be disturbed during construction; approximately 0.16 acres of perennial grass and 0.08 acres of open sagebrush steppe will be disturbed. No state, agency, or federally protected or sensitive plants will be directly affected by project construction. The spread of invasive species associated with ground disturbance may indirectly threaten natural plant communities and sensitive species. A weed management plan and restoration guidelines for disturbed soils have been developed for the project (BRE 2007a; 2007b). Actively managing weeds and promptly establishing native groundcover on disturbed soils will minimize project effects on vegetation.

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APPENDIX D
Riparian Habitat Protection Plan

Clark Canyon Dam Hydroelectric Project
FERC No. 12429-001

Riparian Habitat Protection Plan

Symbiotics LLC

September 2008

Clark Canyon Dam Hydroelectric Project
FERC No. 12429-001

Riparian Habitat Protection Plan

Prepared by:

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975 South State Highway
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Version: September 2008

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1.0 INTRODUCTION

On May 22, 2008, the Federal Energy Regulatory Commission (FERC) requested that Symbiotics LLC file a riparian habitat protection plan to evaluate the adequacy of protection measures for the proposed Clark Canyon Dam Hydroelectric Project FERC No. 12429. The project consists of one facility located on Clark Canyon Dam and Reservoir in Beaverhead County, Montana. The Riparian Habitat Protection Plan provided herein will stipulate terms and conditions which must be met during construction and be approved by pertinent resource agencies prior to construction. This plan is designed to protect and minimize impacts to riparian habitat near access roads to the dam as well as project features. It has been developed in response to FERC's additional information request dated May 22, 2008 as shown below.

> *In your response to the Commission's December 7, 2007, Request for Additional Information No. 1 (Wetland Resources), you stated that, as a component of any federal license, you would develop a comprehensive riparian habitat protection plan for the wetland adjacent to the existing unpaved access road and the riparian corridor along the Beaverhead River. To determine the adequacy of your proposed measures, we will need to analyze your final comprehensive riparian habitat protection plan before action on your application is taken. Therefore, please provide your final plan, after consultation with FWS, Reclamation, Montana DFWP, and EBID. Your filing should include documentation of consultation, copies of agency comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the plan accommodates the agencies' comments. Allow the agencies at least 30 days to comment on the final plan. If you do not adopt an agency recommendation, include in your filing your reasons, based on project-specific information. If the agencies do not reply, you should provide us dated copies of your request for comments.*

2.0 RIPARIAN HABITAT AND VEGETATION IMPACTS DURING CONSTRUCTION AND REHABILITATION

The project area supports two vegetation types: shrub steppe and riparian corridor flanked by palustrine emergent wetlands. Project features located within upland areas, such as the transmission corridor, are dominated by big sagebrush, green rabbitbrush and native grasses such as bluebunch wheatgrass, fescue and indian ricegrass. Vegetation along the face or toe of the dam where the powerhouse and tailrace would be located is similar, but lacks big sagebrush. Movement and operation of construction equipment along prescribed access routes has the greatest potential to disturb riparian habitat and wetland habitat along the Beaverhead River corridor (Figure 1).

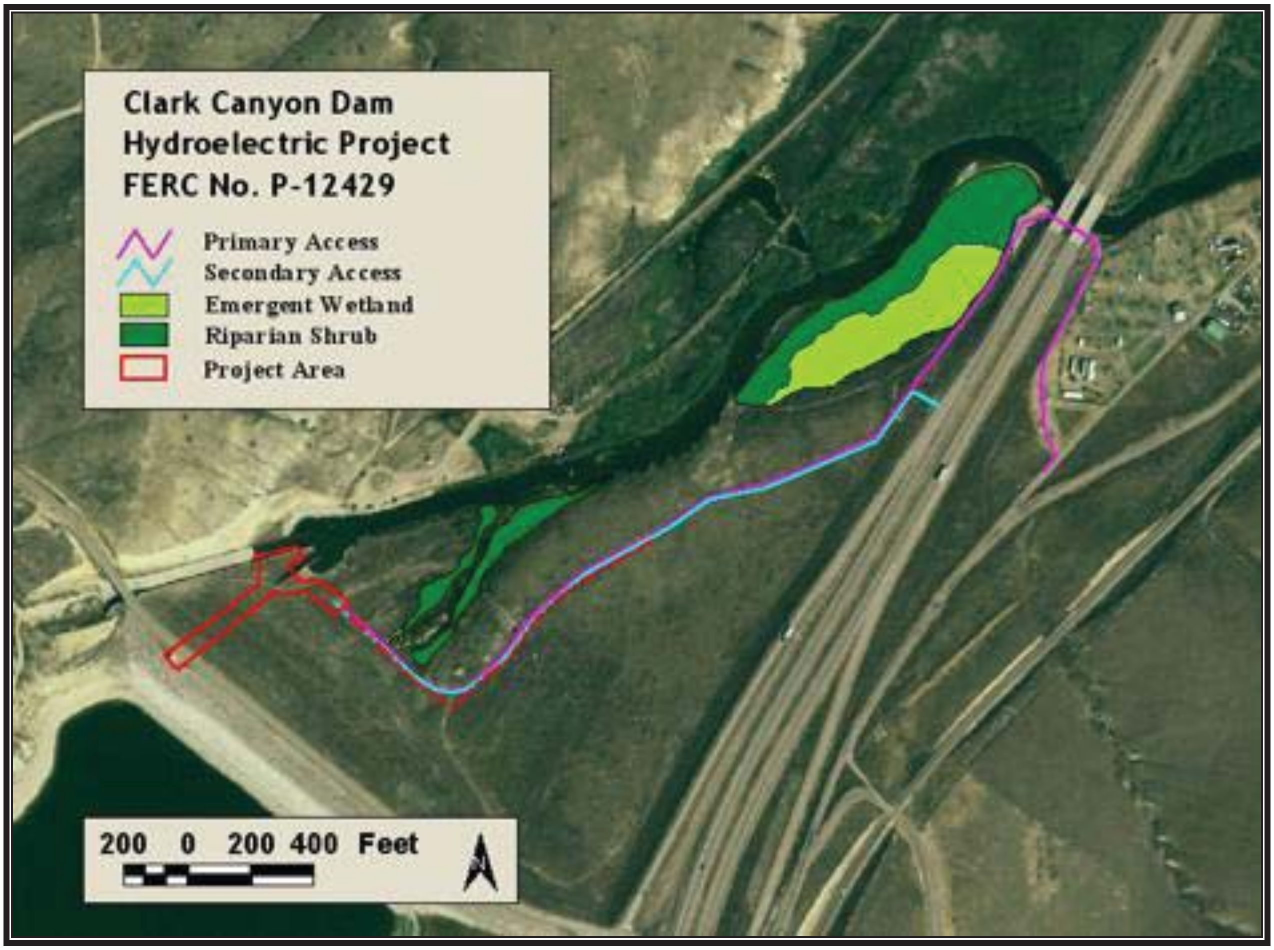

Figure 1. Location of wetland habitat in relation to access and project area.

Lacking appropriate protection and management of riparian and wetland habitat during construction, weedy species may proliferate and compete with native plants. Furthermore, disturbed soils could negatively affect aesthetics and promote erosion. With adequate protection and weed control efforts in place, impacts to desirable native vegetation should be minimized within the upland area as well as the riparian corridor in the vicinity of the project's powerhouse, access roads and transmission line corridor. Under this scenario, the project will have little impact on riparian shrubs, wetlands and adjacent upland vegetation habitat.

3.0 RIPARIAN HABITAT PROTECTION DURING CONSTRUCTION AND REHABILITATION

3.1 Objectives

Ground disturbance during construction creates either direct or indirect opportunities for fragile riparian habitat near the access roads to become temporarily or permanently altered and/or displaced. This Riparian Habitat Protection Plan is designed to prevent temporary and/or permanent damage to the subject property's riparian habitat in the vicinity of the access roads and project features. The plan applies to all areas where ground-disturbing activities associated with the project features and access roads are located. The project licensee and its contractors will be responsible for carrying out methods described herein and has the following objectives:

1) To prevent the temporary or permanent alteration or displacement of riparian or wetland habitats during construction activities.

2) To prevent noxious weeds from becoming established on disturbed soils within the riparian and wetland habitats.

3) To provide long-term protection of the Beaverhead River riparian corridor and adjacent wetlands by maintaining healthy native plant communities within the project area.

3.2 Methods

Construction management as it relates to the protection of riparian habitat has been divided into three stages. Pre-construction management is designed to describe the least damaging practical methods for the installation of project features in the vicinity of the riparian corridor. Construction management is planned to minimize the effects of ground disturbance during construction-related activities near the riparian corridor. Reseeding measures and noxious weed control are intended to further protect the project's riparian corridor and adjacent wetlands in the vicinity of the permanent access road after completion of construction activities.

For the purposes of construction, a minimum 75-foot buffer from the seasonal high water mark of Beaverhead River and flanking wetlands will be established as the boundary for any surface disturbing heavy equipment. The buffer will exclude areas along the current access road where it is less than 75 feet from wetland and riparian areas. This boundary will be clearly flagged and, where appropriate, include silt fencing. In addition, it may become necessary to install other types of fencing, such as barrier fencing to ensure wetlands and riparian vegetation located close to the access roads is clearly marked. This will aid in preventing any inadvertent crossings of wetland habitat. To eliminate the need of surface disturbing heavy equipment within areas close to wetland habitats, an additional access point will be located off of I-15 to allow access to the project site and should reduce the potential for inadvertent impacts to wetlands.

No new right-of-ways (ROW) beyond that of the existing access roads will be constructed. To eliminate any potential from surface runoff from access roads, it may be necessary to lay a gravel base within the ROW.

Construction supervisors responsible for adhering to the Riparian Habitat Protection Plan will review and understand the plan and will provide written confirmation as to this fact. The plan and maps, including designated ROWs and minimum distances of allowable surface disturbing heavy equipment, will be readily accessible to responsible personnel.

All project areas will be inspected weekly for construction-related disturbance within the restricted riparian buffer zone. In the event that vegetation or soils have been impacted within any restricted area, Reclamation's onsite manager will contacted immediately and appropriate remediation measures will be implemented.

4.0 REVEGETATION

4.1 Soil Preparation

Original topography will be preserved or recreated wherever possible. This will be especially important in the areas surrounding the transmission line corridor as well as staging areas. Where allowable, soils compacted by construction equipment will be ripped to a depth of six inches to restore permeability. Noxious weeds on and adjacent to prepared soils will be removed prior to reseeding according to procedures described in the Weed Management Plan (BRES 2007a).

4.2 Reseeding and Planting

All disturbed soils will be reseeded or planted with a mix of native plants which satisfy Reclamation requirements. Rehabilitation and initial paintings will begin immediately following construction activities. Additional plantings will extend into the following growing season and monitoring/maintenance will continue for the duration of the project license (Table 1).

Primary project disturbance will occur within the powerhouse, transformer pads and transmission line corridor, which are all located in upland areas. The reestablishment of species in much of the upland sites will begin immediately after construction activities. A tentative seed mix has been planned for upland areas. All of the species will be native to the area, and should be approved by the resource agencies prior to any land disturbing activities.

All plant species will be seeded during the fall. Prior to seeding, the area should be contoured as appropriate, and salvaged topsoil should be spread. Any compacted areas should be ripped to a depth of six inches.

If areas of riparian-influenced vegetation are disturbed, immediate action will take place to correct the problem. Any area, should it be necessary will be replanted with *Carex*/rush sod matting or sod plugs. Symbiotics will continue to work closely with habitat biologists from Reclamation, MFWP and USFWS during construction regarding any re-vegetation in upland areas as well as riparian habitats should it become necessary.

Topsoil will be salvaged and stockpiled, if applicable, prior to initiating repairs from any areas where excavation or ground disturbance could result in its removal. When upgrades to the dam are completed, the topsoil will be re-spread to match the natural contours of the site. Where excessive soil compaction has occurred, soils will be ripped to a depth of six inches. In places where foot traffic or construction equipment has altered the natural slope of the land, equipment will be used to contour the site to correspond with similar areas and minimize the area's susceptibility to erosion. Any existing weeds within or immediately adjacent to the seedbeds will be hand-pulled and/or mechanically removed prior to seeding efforts. All activities related to topsoil stripping and stockpiling will adhere to Reclamation requirements (BRES 2007a).

Riparian sod mats, if found within the construction area, will be carefully scalped and stockpiled. These will be kept wet and viable on location and strategically re-applied following completion of construction to accelerate riparian recovery.

Plantings of native species are designed to rely on natural precipitation. Additional irrigation is not planned because it could encourage weedy species and/or erosion.

Certified weed-free mulch and/or straw will be spread over seeded areas to retain moisture and protect the site from erosion; however, additional protective measures may be needed. Fertilizer will not be used during the initial plantings. The species selected for planting are adapted to conditions at the site; use of fertilizer could encourage the growth of weedy species. If the growth and condition of seeded and planted species fails to meet goal parameters, soil samples may be analyzed for nutrient content/texture and appropriate amendments recommended for the site. Proposed revegetation measures are also described under the Revegetation Guidelines (BRES 2007b), which were submitted to the FERC in June, 2007 following agency review.

Table 1. Implementation schedule for revegetation/rehabilitation of disturbed and poorly vegetated sites.

Action	Timeframe
Control Weeds	
Control Weeds	
Place Sediment Catch Structures	Prior to ground disturbance
Salvage Topsoil (If Applicable)	Prior to ground disturbance
Contour Site, Replace/Rip Topsoil (If Necessary)	Immediately following disturbance
Seed All Disturbed Soils	Upon project or segment completion
Apply Mulch/Erosion Control Fiber Mat	Upon project or segment completion
Plant Seedlings and Shrubs	Upon project or segment completion
Monitor Cover Within Seeded Areas Based on Established Protocols and Goal Parameters	Upon completion
Control Weeds	As necessary
Monitor Cover Within Seeded Areas Based on Established Protocols and Goal Parameters	Post-construction monitoring
Evaluate Survival of Seedlings Based on Established Protocols and Goal Parameters	Post-construction monitoring
Replace Lost Seedlings, Modify Locations and Methods Based on Results of Evaluation	Post-construction monitoring
Monitor Cover and Seedling Vigor Based on Established Protocols and Goal Parameters	Annually for initial three years or until goal parameters are met
Reseed, Replant, Amend Soils	As necessary

5.0 MONITORING AND REHABILITATION MEASURES

The riparian corridor in the vicinity of the access roads and transmission corridor will be monitored weekly for compliance with the protection measures until construction and subsequent reclamation work is completed. Details regarding long-term monitoring/reporting and an evaluation of rehabilitation efforts will be provided in the final report for the project Revegetation Plan (BRES 2007b).

6.0 REFERENCES

Blue Rye Ecological Services (BRES). 2007a. Weed Management Plan: Clark Canyon Dam Hydroelectric Project FERC No. 12429. Prepared by Blue Rye Ecological Services, Tekoa, WA. Prepared for Symbiotics, LLC. June, 2007. 11 pp.

Blue Rye Ecological Services (BRES). 2007b. Revegetation Guidelines: Clark Canyon Dam Hydroelectric Project FERC No. 12429. Prepared by Blue Rye Ecological Services, Tekoa, WA. Prepared for Symbiotics, LLC. June, 2007. 9 pp.

APPENDIX E
Revegetation Guidelines

Revegetation Guidelines

Clark Canyon Dam
Hydroelectric Project
FERC # 12429

June 2007

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Tables

Figures

1.0 Overview

This reclamation plan has been prepared for vegetation impacted by the Clark Canyon Dam Hydrolelectric Project (FERC#12429) located on the Beaverhead River in Beaverhead County, Montana. The project proposes to retrofit existing facilities for the generation of hydroelectric power. Sensitive species surveys and a vegetation characterization were completed in June 2007 (BRE 2007a). Project activities will remove 0.13 acres of vegetation and disturb 0.24 acres (Fig. 1). Under these guidelines all disturbed areas will be returned to a condition comparable to their current state within five years of the completion of construction.

2.0 Baseline Information

2.1 Location and Ownership

Clark Canyon Dam is located at the head of the Beaverhead River approximately 20 miles southwest of Dillon, Montana. The dam was built in 1964 by the Bureau of Reclamation and is currently operated by the East Bench Irrigation District. Clark Canyon Hydro, LLC is the project licensee and is responsible for the implementation of this vegetation reclamation plan.

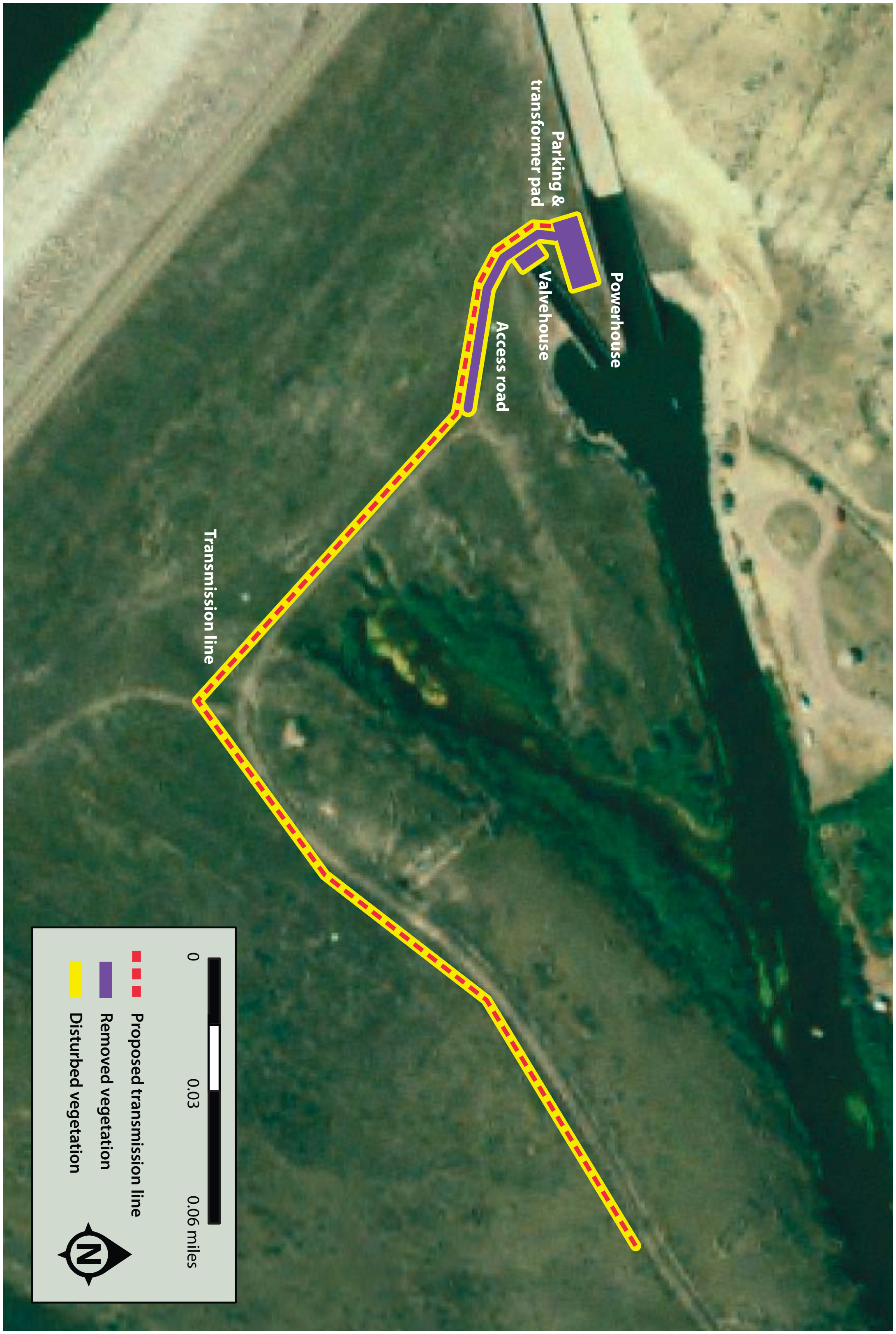
2.2 Land Use

The dam face and lands extending approximately 100 feet from the base of the dam are actively managed by the East Bench Irrigation District to eliminate sagebrush, rabbitbrush and other shrubs, and to minimize noxious weeds. The proposed buried transmission line extends approximately 600 feet beyond this land use type into a shrub steppe community where vegetation is not actively managed. Dispersed recreational use, primarily in the form of pedestrian fishing access, occurs throughout the project area.

2.3 Vegetation Types

Two general plant communities are present within the project area. The first community occupies the face of the dam, runs between the concrete spillway and outlet works, and extends 50 to 100 feet from the base of the dam. Gravelly dam fill material provides substrate in these areas and vegetation is actively controlled to eliminate shrubs. Perennial grasses, seeded following dam construction, are the dominant species throughout this area. Crested wheatgrass (*Agropyron cristatum*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and blue wildrye (*Elymus glaucus*) are the most common grasses (BRE 2007a). The proposed powerhouse, parking area, valvehouse, access road, and the initial 700 feet of the transmission line will disturb/displace this community.

The second community extends along the existing access road where the final 600 feet of transmission line will be buried. Perennial grasses continue to form a primary component within this community; however a shrub element and a greater variety of native forbs are also present. Basin big sagebrush (*Artemisia tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) are common, although they do not form an extensive canopy. Pasture sagebrush (*Artemisia frigida*) is widespread as a groundcover in this area, and native forbs such as paintbrush (*Castilleja sp.*), pussytoes (*Antennaria racemosa*), and Howell's milkwetch (*Astragalus howellii*) are present (BRE 2007a).



prepared by: N. Nielson

source: 2005 NAIP photo, NPSI project drawing

Figure 1. Project location and affected area.

We did not characterize plant communities outside of the area of direct project impacts; however it is important to note that a wetland complex is present approximately 25 feet northeast of the existing access road. The wetland is associated with seepage from the dam and occurs on the opposite side of the road from where the transmission line will be buried. No wetlands are present within affected project areas.

2.4 Hydrology

Affected project areas are not subirrigated and receive only local runoff and precipitation. Precipitation averages 12 inches annually.

2.5 Soils

Dam fill material comprises the soil for the majority of the project site. This soil is minimally developed and gravelly. Thin sandy, gravelly loam extends beyond the base of the dam along the existing access road.

3.0 Goals and Objectives

3.1 Objective

The primary objective of this reclamation plan is to ensure the establishment of native vegetation within all disturbed areas.

3.2 Goals

Goals have been established consistent with the mitigation objective.

1. Construction practices will minimize erosion potential.
2. Construction practices will protect soils from compaction.
3. Construction practices will minimize the introduction and growth of noxious weeds.
4. Cover by native vegetation will increase each year until the prescribed cover performance criteria are met.
5. Non-native vegetation will be managed to remain below 10 percent relative cover and invasive or noxious vegetation will remain below 2 percent relative cover during the monitoring period.

4.0 Work Plan

The following work plan provides a general outline and timeframe for the measures that will be used to revegetate disturbed soils within the project area. The weed management plan describes measures that will be used to limit the spread of invasive weeds during construction (BRE 2007b).

4.1 Water Source

Local precipitation and surface runoff will serve as the water source for planned vegetation. Seeding will occur during the fall or early spring to take advantage of soil moisture.

4.2 Planned Soils

During project construction topsoil will be stockpiled within uplands in the project area. In excavated areas subsurface soil will be used as initial fill. Original topography will be preserved or recreated wherever possible. On unstable slopes contouring may be used to minimize erosion. Soils compacted by construction equipment will be ripped to a depth of four to eight inches to restore permeability. Approximately six inches of salvaged topsoil will then be spread on and raked with a narrow-toothed spike to promote water retention. Additional clean topsoil may be obtained locally to create an adequate seedbed. Once topsoil has been spread, unnecessary vehicle traffic will be excluded from restoration areas. Clean straw or other mulch will be used over seeded areas to minimize soil desiccation and loss. A silt fence will be used to protect wetlands to the north of the project area during construction phases; other erosion control measures will be implemented as needed.

4.3 Planned Vegetation

All disturbed soils surrounding the powerhouse, transmission pad and parking area, valvehouse, new access road, and transmission line corridor will be seeded with a mix of local source, native, graminoids (Table 1). Broadcast equipment will apply the seed mixtures to the prepared bed. To inhibit erosion and encourage successful germination, a layer of clean straw will be spread over seeded areas and crimped into the soil. Some forbs are expected through natural regeneration. Forbs are not included in the seed mixtures because of the necessity for chemical weed control while vegetation becomes established (see weed management plan; BRE 2007b).

Table 1. Recommended seed mix for site reclamation.

Scientific Name	Common Name	approxs eeds per pound	target pure live seed (PLS[1]) per ft^2	pounds PLS per acre
Elymus trachycaulus	slender wheatgrass	160,000	30	8
Pseudoroegneria spicata	bluebunch wheatgrass	130,000	30	10.3
Leymus cinereus	basin wildrye	120,000	20	7.3
Koeleria macrantha	prairie junegrass	780,000	10	0.6
Poa scabrella[2]	pine bluegrass	390,000	10	1.1

[1]Target rates of 100 viable seeds per square foot are based on broadcast seeding methods.

[2]*Poa sandbergii* could be substituted at a similar rate

4.4 Timeline

Erosion control measures will be in place prior to ground disturbance. Soil preparation and seeding will take place within three months of the completion of construction.

5.0 Performance Standards

The following measurable performance criteria are designed as indicators of revegetation success.

Criteria: Vegetation will attain cover comparable to baseline conditions (>80% aerial cover; BRE 2007a) within five years of project completion.
Metric: Aerial cover, estimated within ten one-meter radius sampling plots.

Criteria: Vegetation will persist at a height (>1.5 feet) and vigor similar to baseline conditions.
Metric: Vegetation height, estimated within ten one-meter radius sampling plots.

Criteria: Native vegetation will comprise greater than 90% relative cover.
Metric: Relative cover, calculated within ten one-meter radius sampling plots.

Criteria: Noxious weeds will comprise less than two-percent relative cover within revegetated areas.
Metric: Relative cover, calculated within ten one-meter radius sampling plots.

Criteria: Significant erosion will be absent from revegetated areas.
Metric: Rills, sediment fans, and other indicators of soil movement recorded within ten one-meter radius sampling plots.

6.0 Monitoring Plan

6.1 Annual Monitoring

The licensee is responsible for performing or contracting to perform annual monitoring of revegetated areas for a minimum of three years following construction. Monitoring will be conducted with the express purpose of documenting the achievement and maintenance of the performance criteria (Section 5.0). Monitoring will begin within 12 months of seeding and will take place between May 15 and July 1 annually. Monitoring will continue for one year beyond the implementation of any remedial measures, or one-year beyond the achievement of performance criteria (whichever is greater) regardless of whether the three-year minimum has been met.

Annual monitoring will include:

1. Photographs from three permanent monitoring points within the site. The field of view (i.e. azimuth) will be indicated and remain fixed for the duration of monitoring.

2. Data from a minimum of 10 monitoring plots. Vegetation data will include aerial cover by each species present within the plot, total vegetation cover and height of vegetation.

3. Inspection of all sediment control devices, and photographic documentation of any soil movement evident on site (i.e. rills, sediment deposits, etc.).

6.2 Reports

A report of the annual monitoring results will be submitted to the Bureau of Reclamation East Bench Irrigation District by December 31 of each year. This report will include at a minimum:

- Description of site conditions and actions that have been taken in the previous year
- Listing of all species present and their average aerial cover, relative cover, frequency and origin (native or not).
- Average total ground cover and height of vegetation.
- Description of any soil movement documented.
- Declaration of the performance criteria that have been met and a description of the progress made toward reaching any criteria that are not yet attained.

If significant progress toward, or achievement of, performance criteria is lacking during any monitoring year, a remedial action plan will be developed and submitted to the Bureau of Reclamation 60 days in advance of any planned activity at the site. Approved remedial measures will be implemented prior to the subsequent year's monitoring effort.

7.0 Maintenance

The licensee will be responsible for prescribing maintenance for project vegetation for the duration of the license. Maintenance may be contracted to an appropriate third party. During the initial monitoring period vegetation maintenance will be tailored to the needs identified during annual monitoring. Ongoing maintenance will include the removal of any litter or debris and the control of invasive weeds (see weed management plan; BRE 2007b).

8.0 Adaptive Management

The licensee is ultimately responsible for the success of revegetation measures. Adaptive management refers to additional measures that may be used to bring the site into compliance with the performance criteria if progress is not being made toward these goals.

Threats to project success specific to this site include competition from noxious weeds, drought, and human foot or vehicle traffic. Proactive control of invasive plants is described within the weed management plan (BRE 2007b). Drought may necessitate re-seeding areas and applying additional mulch. If human disturbance is identified as a factor preventing the attainment of performance criteria, signs or fencing may be used to deter trespassing.

Adaptive management will be triggered by the following events:
- Any decline in the cover of native vegetation during the three years following construction.
- The presence of invasive vegetation in excess of five-percent total cover.
- Significant erosion or sedimentation.
- The failure of seed to successfully germinate and sprout over any area larger than 25 square feet.
- Failure to meet performance criteria within five years.
- Other natural occurrences such as fire or insect infestation may also necessitate adaptive management.

Measures that may be used to address these conditions include:
- Signs and fencing to protect plantings
- More frequent weed control treatments
- Re-seeding or planting areas
- Applying additional mulch
- Placing additional sediment control structures within or surrounding the site
- Control of insect infestations

A brief description of any remedial measures will be submitted to the Bureau of Reclamation at least 60 days in advance of any planned activity at the site.

9.0 Contingency Plans

If project vegetation fails to attain performance standards within three years, adaptive management and annual monitoring will continue on the site for an additional two years. At the close of this two-year "grace period" alternative revegetation strategies will be pursued in consultation with the Bureau of Reclamation.

10.0 References

BlueRye Ecological Services (BRE). 2007a. Clark Canyon Dam Hydroelectric Project (FERC# 12429): Vegetation Characterization. Unpublished report, BlueRye Ecological Services, Tekoa, WA.

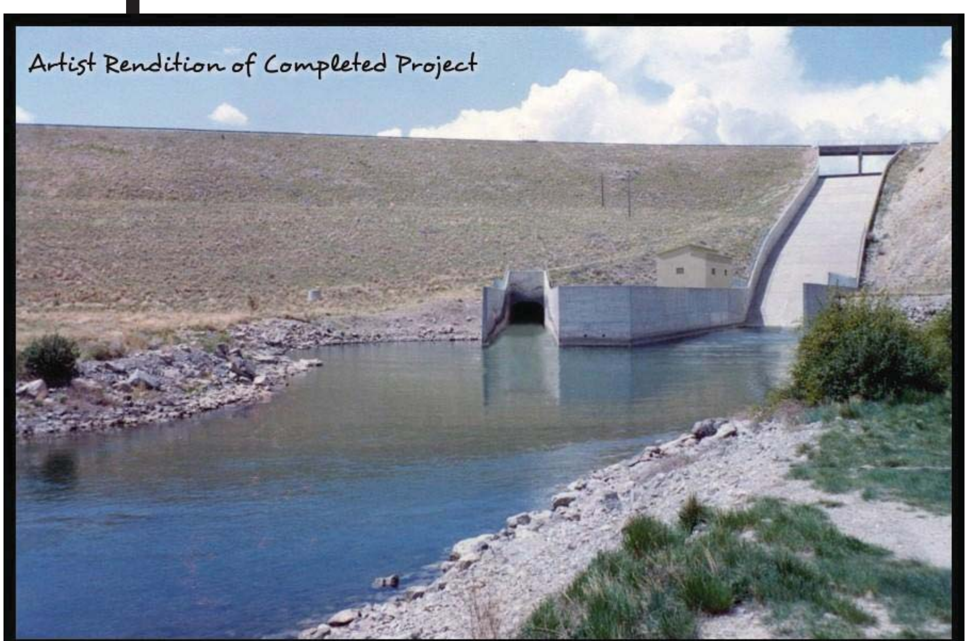
BlueRye Ecological Services (BRE). 2007b. Clark Canyon Dam Hydroelectric Project (FERC# 12429): Weed Management Plan. Unpublished report, BlueRye Ecological Services, Tekoa, WA.

APPENDIX F

Water Quality Monitoring Summary

Clark Canyon Hydroelectric Project
FERC No. 12429-001

Water Quality Monitoring Summary



December 2007

Clark Canyon Hydroelectric Project

FERC No. 12429-001

Water Quality Monitoring Summary

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Version: December 2007

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1.0 INTRODUCTION

This report describes monitoring performed at Clark Canyon Hydroelectric Project, FERC No. 12429 (Project). The intent of this monitoring report is to summarize and share data collected in 2007 as the first step of the effort to establish baseline conditions for water quality and macroinvertebrate assemblages.

In March 2007, a Water Quality Monitoring Plan (Appendix I) was sent to the U.S. Bureau of Reclamation, the U.S. Fish and Wildlife Service, Montana Fish, Wildlife and Parks and Montana Department of Environmental Quality for review and comment. Reclamation responded April 20, 2007 with a letter requesting a few clarifying edits to the document. No changes were made to the monitoring plan. On November 19, 2007, Symbiotics submitted the draft Water Quality Monitoring Summary to the U.S. Bureau of Reclamation, the U.S. Fish and Wildlife Service, Montana Fish, Wildlife and Parks and Montana Department of Environmental Quality for review and comment. No comments were received within the 30-day comment period. All agency and applicant correspondence is available in Appendix II.

Monitoring efforts documented dissolved oxygen (DO) and temperature in Clark Canyon Reservoir as well as DO, temperature, total gas pressure (TGP), total suspended solids (TSS), and turbidity in the Beaverhead River below Clark Canyon Reservoir. Reservoir monitoring began in June 2007 and continued through October 2007. Monitoring in the Beaverhead River below Clark Canyon Reservoir began in June 2007 and will continue through 2009. This report summarizes the data collected through October 2007.

The objective of the water quality study is to obtain detailed spatial and temporal data for five parameters: temperature, dissolved oxygen, total gas pressure, total suspended solids, and turbidity. Specific objectives for the study include:

1) Increase the temporal resolution of the parameters of concern;
2) Increase the spatial resolution of the parameters of concern;
3) Provide data that will facilitate comparisons during construction and operation to pre-construction baseline data;
4) Help determine the project's contribution, if any, to violations of water quality criteria as set forth in the Montana Water Quality Standards; and,
5) Establish a background density of aquatic macroinvertebrates in a free-flowing section of the Beaverhead River in a location downstream of the Clark Canyon Reservoir.

2.0 RELEVANT WATER QUALITY STANDARDS

Water quality standards in the state of Montana are published in Circular DEQ-7 and reflect numeric water quality standards developed in compliance with state and federal regulations. Standards reported here are outlined in the February 2006 version of Circular DEQ-7. Many of these standards are contingent on the classification of surface waters. Both Clark Canyon Reservoir and the Beaverhead River downstream of Clark Canyon Dam are classified as B-1.

2.1 Temperature

Montana does not have absolute standards for water temperature. Rather, temperature regulation is relative and prohibits increases of various amounts above "naturally occurring water temperature." According to ARM 17.30.623, a 1ºF maximum increase above naturally occurring water temperature is allowed within the range of 32ºF to 66ºF; within the naturally occurring range of 66ºF to 66.5ºF, no discharge is allowed which will cause the water temperature to exceed 67ºF; and where the naturally occurring water temperature is 66.5ºF or greater, the maximum allowable increase in water temperature is 0.5ºF. A 2ºF per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55ºF. A 2ºF maximum decrease below naturally occurring water temperature is allowed within the range of 55ºF to 32ºF.

2.2 Dissolved Oxygen

The Freshwater Aquatic Life Standard for dissolved oxygen in Montana is contingent upon the classification of the waterbody and the presence of early life stages of fish. Although both Clark Canyon Reservoir and the Beaverhead River are classified as B-1, they support slightly different fish assemblages and therefore could have different standards for dissolved oxygen.

For both waterbodies, the Montana Fisheries Information System database supported by Montana Fish, Wildlife and Parks was used to identify the fish species present (MFWP 2007). Then, the table of spawning times of Montana fishes (Skaar 2001) was used to identify spawning times for each fish present. The EPA definition of early life stage was then applied to each species. For salmonids, the early life stage includes up to 30 days after emergence. For other fishes, the early life stage is defined as up to 34 days after spawning. For ease of visualization, the early life stage designation is presented in the same format as the spawning timing chart which divides the year into half-months although it is recognized that this presentation does not reflect the specificity of the EPA standard.

2.2.1 Clark Canyon Reservoir

As summarized in Table 1, Clark Canyon Reservoir provides habitat for many salmonids including brown trout, brook trout, mountain whitefish and rainbow trout. Burbot, common carp and white suckers are also present. These species collectively generate early life stages from March through early October (Table 1). Therefore, the standard for minimum daily dissolved oxygen in the reservoir is 4.0mg/L from October through February and 8.0mg/L from March through early October.

2.2.2 Beaverhead River

As summarized in Table 2, the Beaverhead River downstream of Clark Canyon Dam provides habitat for many salmonids including brown trout, mountain whitefish and rainbow trout. Burbot, common carp, longnose dace, longnose suckers, mottled sculpin, mountain suckers and white suckers are also present. These species collectively generate early life stages from early March through early October (Table 2). Therefore, the standard for minimum daily dissolved

Table 1. Spawning times and subsequent early life stages of fishes in Clark Canyon Reservoir.

Species in Clark Canyon Reservoir	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
	1	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Brown Trout	S	I	I	I	I	I	I	I,E																
Brook Trout	I	I	I	I	E	E	E	E	E								S	S	S	S	I	I	I	I
Burbot			S	S	S	S																		
Common Carp									S	S	S	S	S	S	S	S								
Mountain Whitefish	I	I	I	I	I	I												S	S	S	S	S	I	I
Rainbow Trout					S	S	S	S	S	S	S	S	I	I	E									
White Sucker							S	S	S	S	S	S												

Early life stage for salmonid species

Early life stage for non-salmonid species

S = Spawning period
I = Incubation period for eggs of salmonids
E = Time period during which salmonid sac-fry are in the gravels

Table 2. Spawning times and subsequent early life stages of fishes in the Beaverhead River downstream of Clark Canyon Dam.

Species in the Beaverhead River	**JAN**		**FEB**		**MAR**		**APR**		**MAY**		**JUN**		**JUL**		**AUG**		**SEP**		**OCT**		**NOV**		**DEC**	
	1	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Brown Trout	S	I	I	I	I	I	I	I,E																
Burbot			S	S	S	S																		
Common Carp									S	S	S	S	S	S	S	S								
Longnose Dace									S	S	S	S	S	S	S									
Longnose Sucker						S	S	S	S	S	S	S	S											
Mottled Sculpin									S	S	S	S												
Mountain Sucker											S	S	S	S										
Mountain Whitefish	I	I	I	I	I	I												S	S	S	S	S	I	I
Rainbow Trout					S	S	S	S	S	S	S	S	I	I	E									
White Sucker							S	S	S	S	S	S												

Early life stage for salmonid species

Early life stage for non-salmonid species

S = Spawning period
I = Incubation period for eggs of salmonids
E = Time period during which salmonid sac-fry are in the gravels

oxygen in the reservoir is 4.0mg/L from October through April and 8.0mg/L from March through early October.

2.3 Total Gas Pressure

The Freshwater Aquatic Life Standard for total dissolved gas pressure is 110% of saturation.

2.4 Total Suspended Solids

According to ARM 17.30.623, no increases are allowed above naturally occurring concentrations of sediment or suspended sediment except as permitted in 75-5-318, MCA.

2.5 Turbidity

According to ARM 17.30.623, the maximum allowable increase above naturally occurring turbidity is five nephelometric turbidity units except as permitted in 75-5-318, MCA.

3.0 SAMPLING METHODS

3.1 Water Quality

This report describes the monitoring of dissolved oxygen (DO) and temperature in Clark Canyon Reservoir as well as DO, temperature, total gas pressure (TGP), total suspended solids (TSS), and turbidity in the Beaverhead River below Clark Canyon Reservoir. Flow and precipitation data reported is from the BOR hydromet website.

3.1.1 Clark Canyon Reservoir

3.1.1.1 Sampling Locations

Sampling in the reservoir occurred in the proposed forebay area immediately upstream of Clark Canyon Dam. This site will provide baseline water quality conditions which will aid in determining the extent and magnitude of impacts to water quality as a result of operational activities.

3.1.1.2 Sampling frequency and duration

In Clark Canyon Reservoir, seasonal profile data for temperature and DO was collected once per month from June through October 2007.

3.1.2 Beaverhead River

3.1.2.1 Sampling Locations

Sampling in the Beaverhead River was conducted at five sites downstream of Clark Canyon Dam (Figure 1, Table 3). The uppermost site is directly downstream of the current outlet structure and the lowermost site is just over 10 river miles downstream. The distribution of locations on the Beaverhead River should provide sufficient spatial detail to evaluate the extent and magnitude of both the potential positive and negative impacts to the river as a result of construction and operational activities.

3.1.2.2 Sampling frequency and duration

Samples were collected monthly for water quality parameters starting in June 2007 and will continue through 2009. However, during periods of high water releases from Clark Canyon Dam

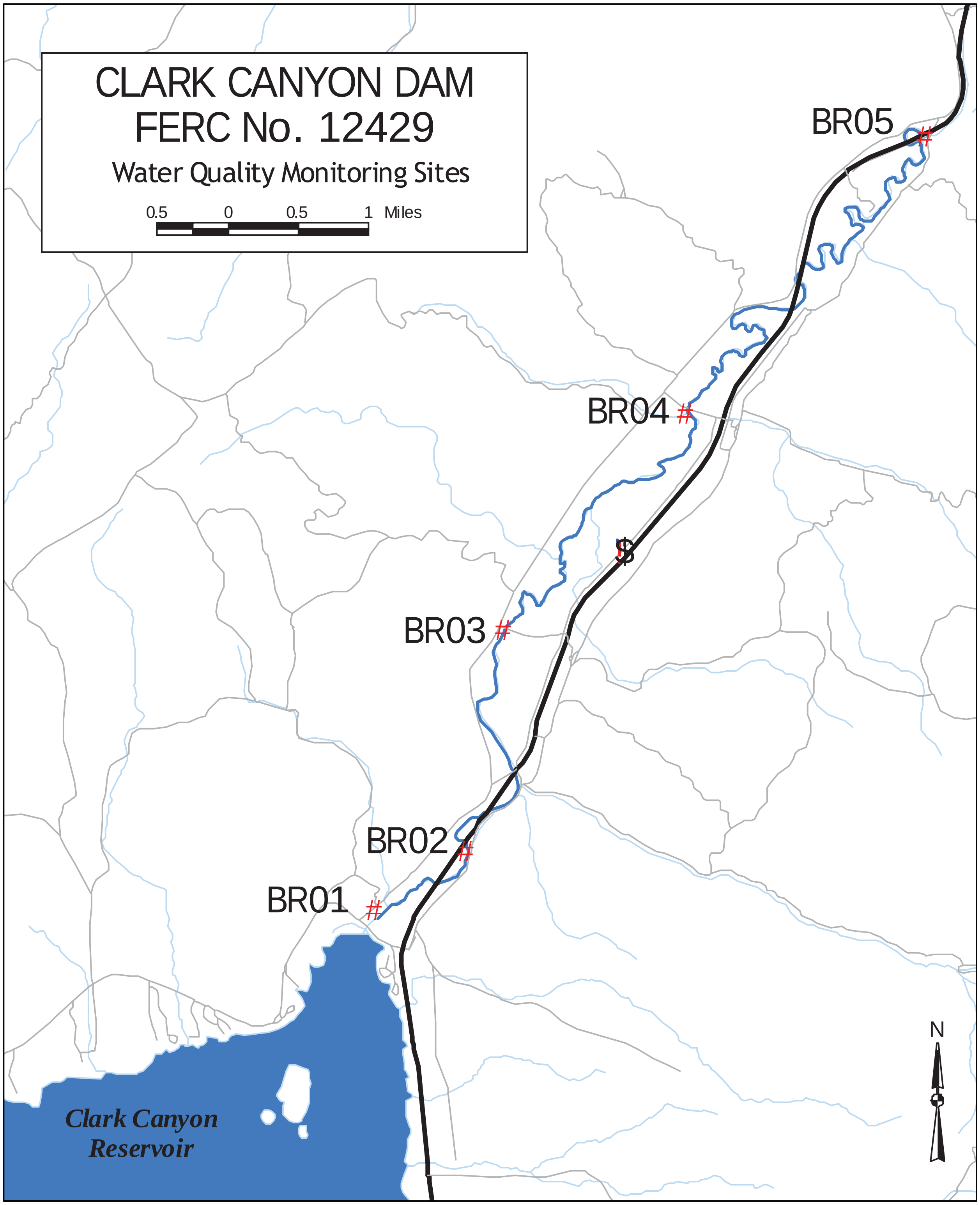

Figure 1. The location of water quality sampling sites within the Beaverhead River below Clark Canyon Dam.

Table 3. Descriptions of the sampling sites in the Beaverhead River below Clark Canyon Dam.

Site ID	Site Description	River Mile
BR01	Downstream of dam outlet	0
BR02	0.9 miles downstream of dam	0.9
BR03	At McMenomey Road Bridge	3.0
BR04	At Henneberry Ranch Road Bridge	5.7
BR05	At Dalys	10.7

(spring runoff), monitoring for water quality will occur on a 2-week basis in the Beaverhead River. This report summarizes monthly sampling from June 2007 through October 2007.

Continuous TGP, temperature, DO and turbidity measurements at 15-minute intervals were collected for at least 48 continuous hours each month at site BR01. Grab samples for TSS and turbidity were taken at the beginning and end of each sampling period. All samples were integrated vertically. At the downstream stations (BR02 through BR05) continuous electronic data were collected 10 minutes at each site. Additionally, a grab sample for turbidity and TSS was collected at each lower site.

A TBO- DL6F total gas probe by Common Sensing, Troll 9500 multi-parameter probe with optical DO (RDO), and a YSI 6920 sonde with polarographic DO and optical turbidity were used to collect water quality measurements. A backup YSI Model 6920 sonde was available in the case any problems were encountered with the equipment. The total gas probe can record dissolved gas concentrations at frequencies up to one minute intervals, so dissolved gas data were collected at 1-minute intervals at the downstream stations (BR02 through BR05). All other parameters were collected at 30-second intervals.

Custom steel boxes were built in order to house, conceal and protect the probes. The probes were calibrated for each parameter according to the manufacturer's specifications (YSI 2001) before being placed in the field. Data was downloaded at the end of each continuous monitoring period using a laptop computer and the software EcoWatch for Windows and TFT tools.

Between June 27 and September 9, 2007, a continuous temperature probe was installed to monitor temperature at BR01 at 15-minute intervals. This probe was checked and downloaded during each monthly sampling trip.

3.1.3 Quality Assurance/Quality Control

Ecosystems Research Institute laboratory is certified by the Utah Division of Epidemiology and Laboratory Services (DELS) for the analysis of ammonia, nitrate, nitrite, all forms of phosphorus, BOD5, conductivity, total suspended solids, total dissolved solids and turbidity.

All data generated are reported in units consistent with data generated by other organizations reporting similar analyses to allow comparability of data among organizations. Specific data quality objectives for accuracy precision and completeness for laboratory analyses are discussed in Ecosystems Research Institute Laboratory Quality Assurance Operations Manual and Standard

Operating Procedures (ERI 2006). Specific data quality objectives for accuracy and precision of sampling are for measurements to fall within a 95 percent confidence interval around the true value. The confidence interval for each parameter is based on prior knowledge of the measurement system and is generated from the EPA publication "Estimation of Generic Acceptance Limits for Quality Control Purposes for Use in a Water Pollution Laboratory" (May 1991).

The TBO- DL6F total gas probe by common sensing measures gas pressure ±2mmHG, which report as percent saturation rounded to the nearest percent. The YSI 6920 sonde with optical turbidity records turbidity to the nearest 0.1 NTU with an accuracy rating of ±2% of reading or 0.3 NTU, whichever is greater. The temperature logger records water temperature with an accuracy of ±0.2°C at 25°C.

On each monitoring run, all samples were kept cool and dark from the moment of collection until delivery to the laboratory. Samples were analyzed at ERI's laboratory, which maintains state and EPA certification for all parameters in this study. Certification for a specific parameter includes a rigorous quality assurance and quality control program. This includes a set of standards for standard curve generation for each analysis run, and spikes, spike duplicates, check samples and blanks analyzed within each sample run (a minimum of one set of QA/QC samples for every 20 field samples). In addition, a field and trip blank were collected during each sample trip to identify any contamination occurring during the sampling process, and at least one field duplicate was collected.

3.2 Macroinvertebrate Sampling Frequency and Methods

3.2.1 Locations

Macroinvertebrate samples were collected just downstream of BR01 and within a riffle-type habitat.

3.2.2 Frequency and Duration

Macroinvertebrate samples are collected quarterly. This report includes samples collected on May 15, August 15, and October 11, 2007. A total of ten replicate invertebrate samples were collected using a modified Hess sampler on each sampling date.

3.2.3 Quality Assurance/Quality Control

Samples were returned to the laboratory, and are currently being processed according to the protocols established by the Montana Department of Environmental Quality (WQPBWQM-009 2006).

4.0 RESULTS

4.1 Water Quality

4.1.1 Clark Canyon Reservoir

Reservoir profiles captured reservoir dynamics over a wide range of reservoir elevations during the summer of 2007 (Figure 2). The reservoir was cool, but stratified in May, with surface temperatures of approximately 14.5°C and a thermocline around 10m with hypolimnion temperatures around 10°C (Figure 3). Surface temperatures continued to warm through July, but began to cool in August and were down to 12.5°C by September. The maximum surface temperature observed was in early July when surface waters reached 22°C. The thermocline was relatively consistent at about 10m deep despite changes in reservoir elevations and reservoir temperatures. Stratification was strong from May through July, but lessened by mid-August and was completely absent by late September when the profile reflected complete mixing throughout the water column and a uniform temperature of approximately 12.5°C.

Dissolved oxygen patterns reflected the thermal stratification of Clark Canyon Reservoir (Figure 4). Surface oxygen concentrations were highest in May at around 9 mg/L, but declined below the thermocline and were below the standard of 8 mg/L in the bottom three meters of the reservoir. Late June showed a similar pattern of stratification, with only slightly lower concentrations. In July and August, dissolved oxygen levels were below the 8 mg/L water quality standard in the epilimnion and considerably lower at 10 m (below the thermocline).

4.1.2 Beaverhead River

4.1.2.1 Flow and Temperature

Discharge from Clark Canyon Reservoir into the Beaverhead River was variable between June 1 and October 15 (Figure 5). In June, flows ranged from 270 to 625 cfs. Discharge peaked in mid-July at 880 cfs. From mid-July to late September, flows steadily decreased to a base flow of 30 cfs. No spilling occurred during the sampling period.

Temperatures in the Beaverhead River show a similar pattern to surface temperatures in Clark Canyon Reservoir (Figure 6, Table 4). Due to probe malfunctions and tampering, temperature data was not collected for the full period between June 1 and October 15 at BR01. Data was collected at 15-minute intervals from June 27 to July17 and from July 24 to September 9. However, during the period of data available, stream temperatures gradually increased, peaking at just over 21°C on August 4 and then gradually decreased to just over 16°C in early September. The range of diurnal variation decreased as the summer progressed but averaged just less than 1°C. Stream temperatures were highest around noon and lowest around midnight.

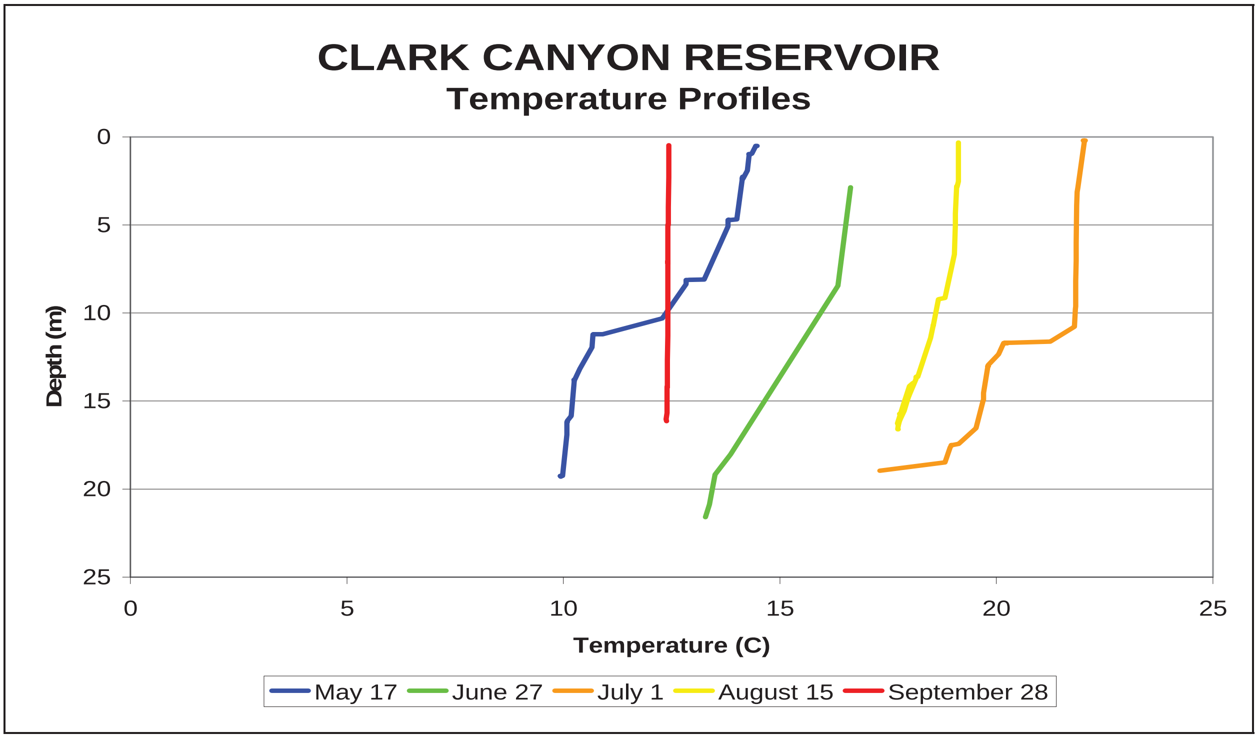

Figure 2. Clark Canyon reservoir elevations from June 1 through October 15, 2007.

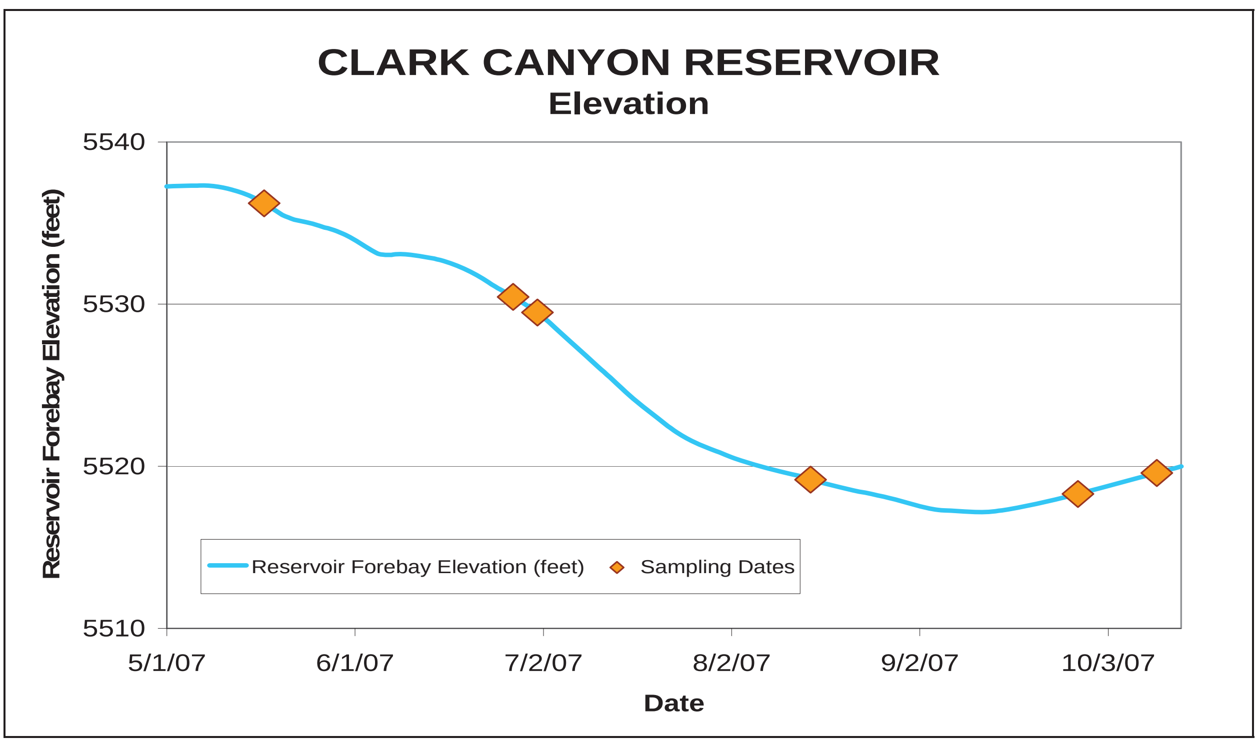

Figure 3. Temperature profiles in Clark Canyon Reservoir during 2007.

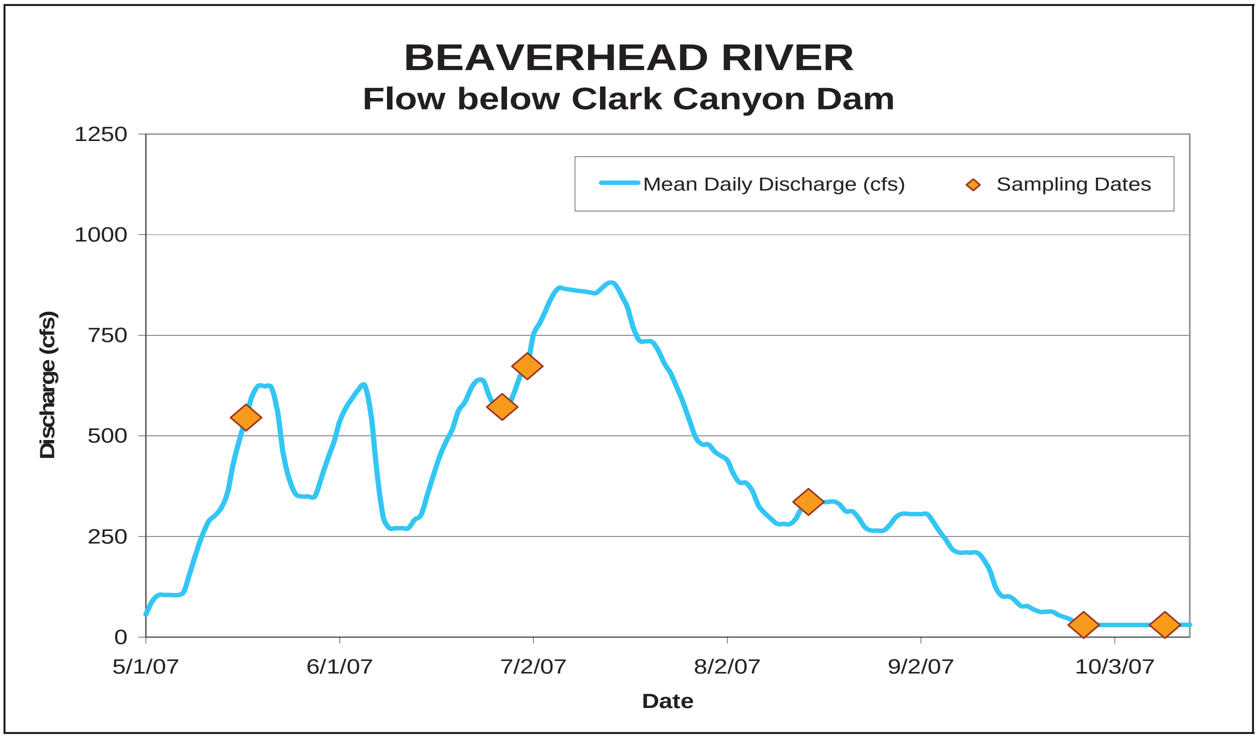

Figure 4. Reservoir releases into the Beaverhead River downstream of Clark Canyon Dam.

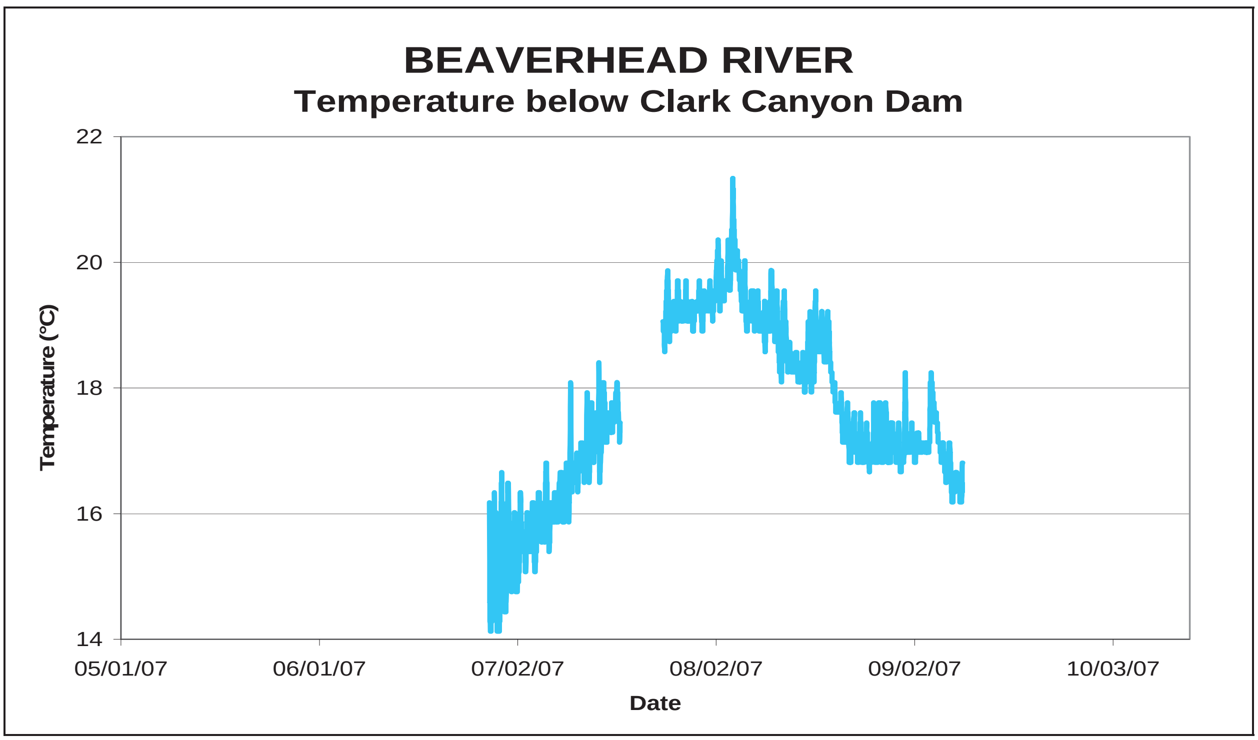

Figure 5. Stream temperature recorded at BR01.

4.1.2.2 Total Dissolved Gas and Dissolved Oxygen

The 48-hour continuous monitoring periods at BR01 highlight variation in water quality at both a diurnal and seasonal scale. Dissolved oxygen in the river was highest during the first sampling period on June 1 and generally decreased over the course of the summer (Figure 7). Dissolved oxygen levels exceeded the 8mg/L standard in both June samples and during the samples collected in August, but dipped below 8mg/L in July and were well below the standard when samples were taken in late September and October (Figure 7). Daily variation was only discernable in late summer and fall samples. Dissolved oxygen levels increased during daylight hours in this period, peaked around 2pm, and were lowest in the early morning hours. This daily variation of just over 0.5 mg/L/day is likely caused by primary production.

Total gas pressure showed a similar seasonal trend as dissolved oxygen (Figure 8). Saturation levels were highest during the first sample in early June and steadily declined over the course of the summer. Saturation levels dropped below the 110% saturation standard by the time samples were taken in late September and stayed low in October. Daily variation in total gas pressure also tracked dissolved oxygen. No discernable daily variation was present in the summer monitoring periods and only minor daily variation can be seen in the observations from September and October.

Total dissolved gas pressure trends appeared to track discharge from Clark Canyon Dam. From the limited data thus far, dissolved gas levels exceed standards even in the absence of spilling and at discharges as low as 330 cfs (Figure 9). Further monitoring will provide additional insight into this relationship but it clear that dissolved gas levels are elevated for much of the summer in the Beaverhead River below Clark Canyon Dam.

In addition to the 48-hour continuous monitoring, shorter observations of dissolved oxygen and total gas pressure were made at four additional sites downstream (BR02 through BR05). This longitudinal sampling was intended to illustrate the spatial extent of any water quality effects of Clark Canyon Dam. In order to relate this monitoring to water quality standards, the maximum total gas pressure and the minimum dissolved oxygen levels is reported. The maximum total gas pressure exceeded the 110% water quality standard at sites BR01 through BR04 during samples taken June 27 (Figure 10, Table 5). None of the downstream sites (BR02 through BR05) violated the total gas pressure standard at any other time. Further monitoring will provide additional insight into this relationship but it is clear that dissolved gas levels are rarely elevated, even at BR02 which is 0.9 miles downstream of the dam and that total gas pressure at BR05 is not affected by Clark Canyon Dam.

Patterns of dissolved oxygen were similar to TDG. The minimum dissolved oxygen levels always met state standards at sites BR02 through BR04 (Figure 11, Table 6). At BR01, dissolved oxygen levels fell below state standards during the July, September and October samples. Oxygen levels at BR05 fell below the 8 mg/L standard in July and October, but it is clear from observations at intermediate sites that these violations are not related to dynamics at Clark Canyon Dam.

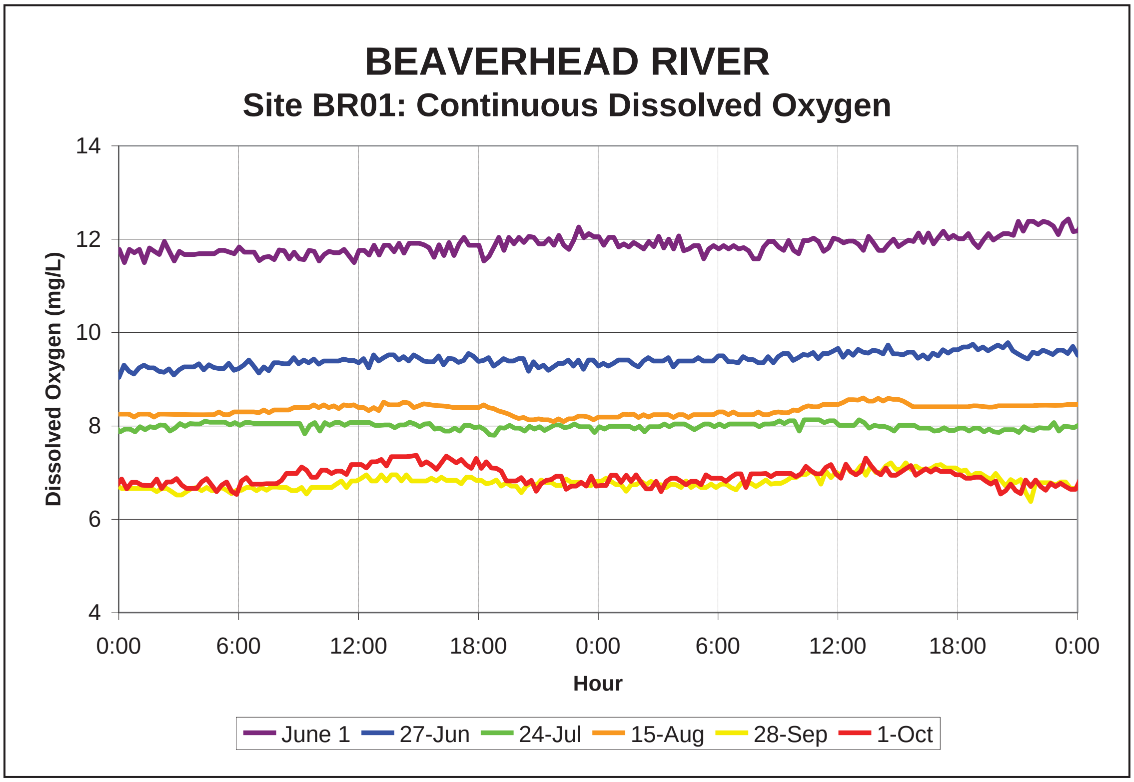

Figure 7. Monthly 48-hour dissolved oxygen monitoring at site BR01 downstream of Clark Canyon Dam on the Beaverhead River.

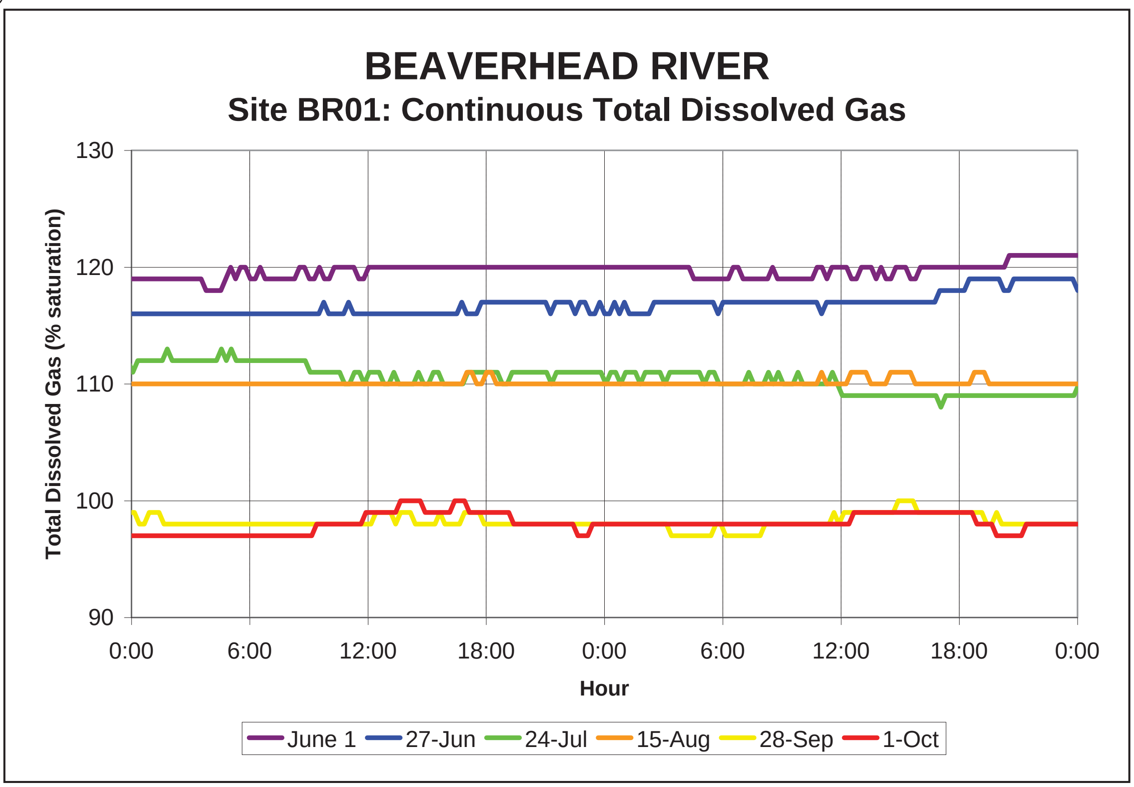

Figure 8. Monthly 48-hour monitoring of total dissolved gas at site BR01 downstream of Clark Canyon Dam on the Beaverhead River.

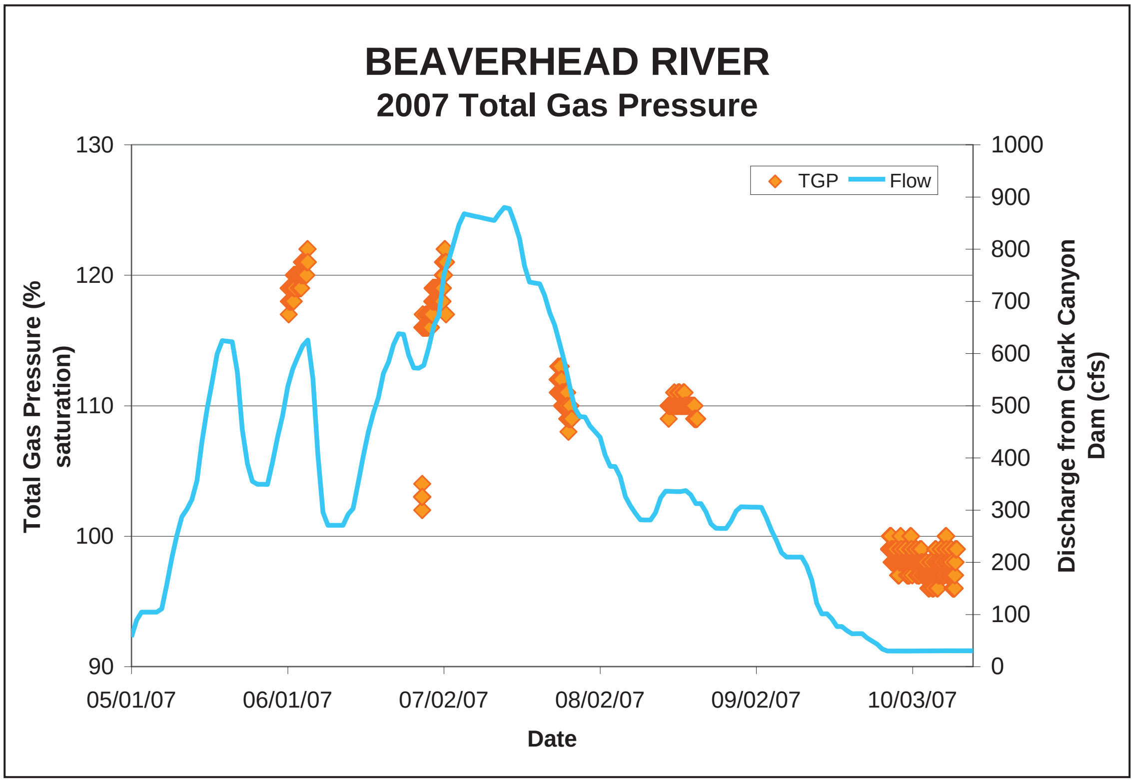

Figure 9. Dissolved gas monitoring at BR01 in the context of the volume of releases from Clark Canyon Dam.

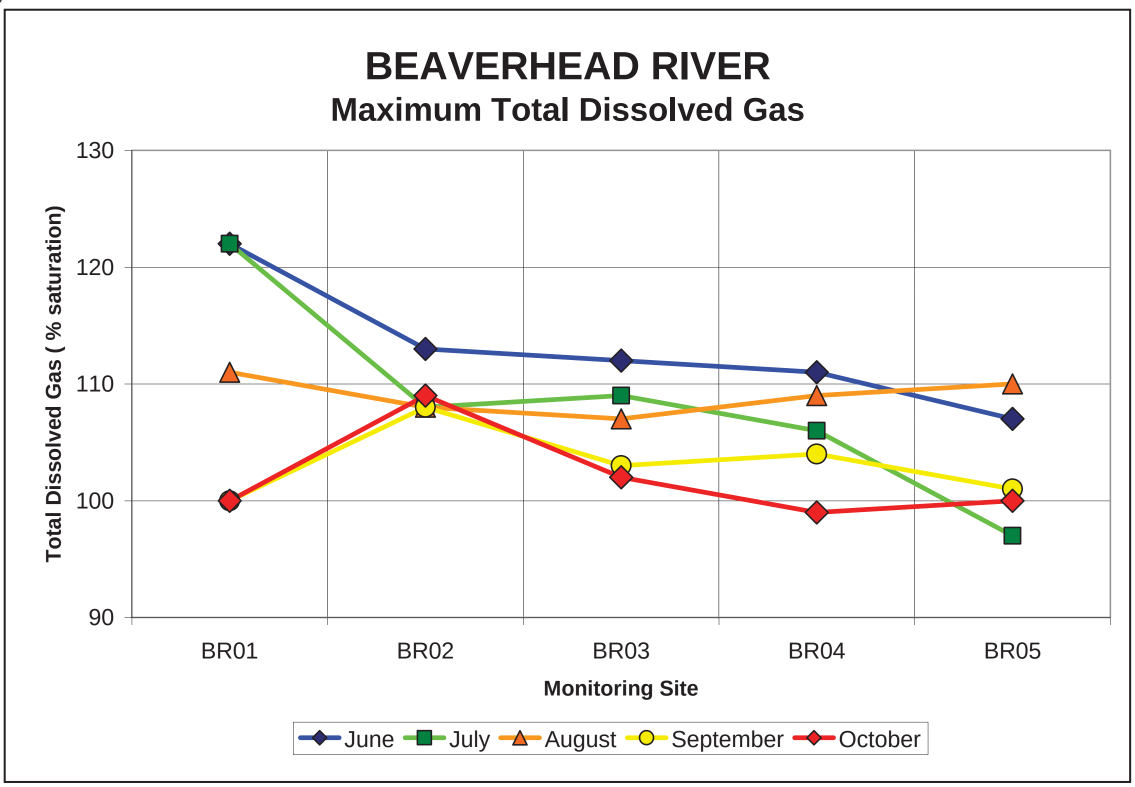

Figure 10. Maximum total gas pressure at all monitoring sites on the Beaverhead River downstream of Clark Canyon Dam.

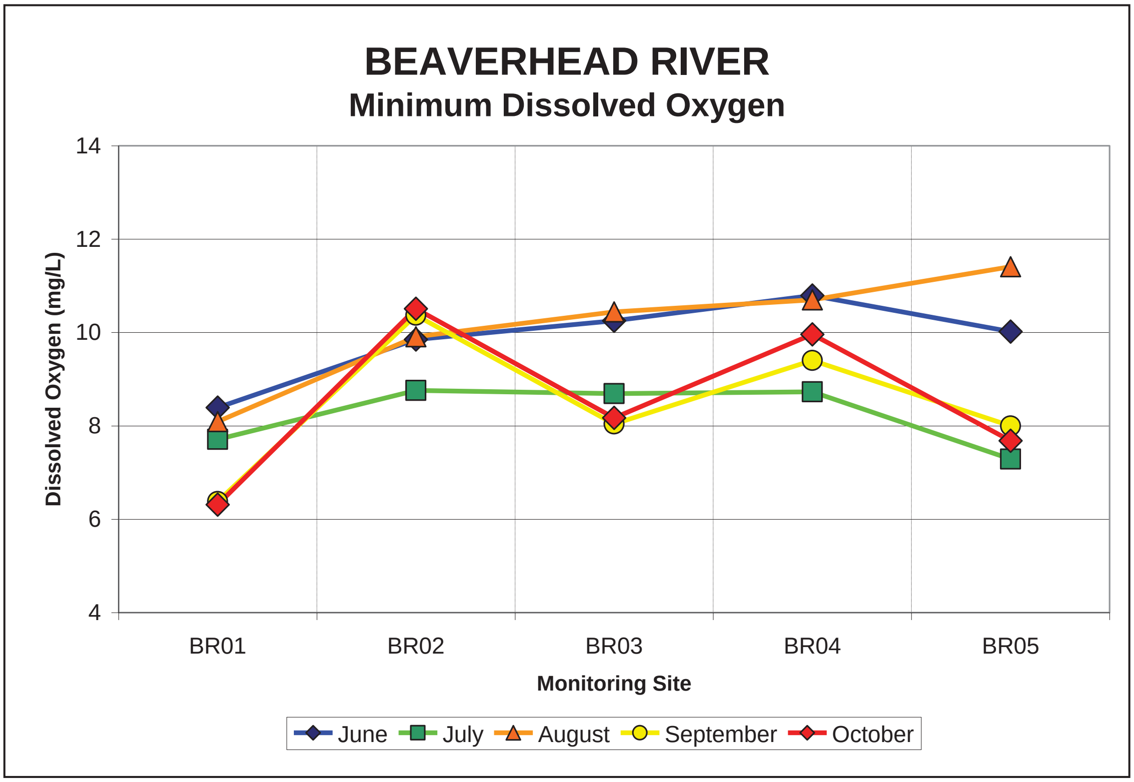

Figure 11. Minimum levels of dissolved oxygen at all monitoring sites on the Beaverhead River downstream of Clark Canyon Dam.

Table 4. Stream temperatures at BR01.

Day	June	July	August	September
1		15.2	19.4	17.1
2		15.5	19.8	17.1
3		15.5	19.7	17.1
4		15.6	20.3	17.6
5		16	19.8	17.4
6		16	19.3	16.8
7		16	19.3	16.7
8		16.3	19.1	16.5
9		16.3	19	16.3
10		16.8	19.3	
11		16.8	18.9	
12		16.9	18.9	
13		17.1	18.4	
14		17.3	18.3	
15		17.5	18.2	
16		17.5	18.5	
17		17.7	18.7	
18			18.7	
19			18.6	
20			17.9	
21			17.5	
22			17.2	
23			17.1	
24		18.9	17	
25		19.2	17	
26		19.2	17	
27	14.3	19.2	17.2	
28	15	19.3	17.2	
29	15.2	19.2	17.1	
30	15.3	19.3	17	
31		19.3	17.1	

4.1.2.3 Turbidity and Suspended Solids

The monthly 48-hour continuous monitoring of turbidity at BR01 revealed that turbidity levels in the Beaverhead River are generally low, but do show some seasonal variation (Figure 12). Turbidity levels were highest in September and October, although they were still relatively low, exhibiting peaks less than 14 NTU (Figure 13). There was no clear correlation of turbidity and precipitation events at site BR01, which may reflect the buffering effect of the reservoir. Although future sampling should provide more insight, it does appear that turbidity levels are higher when the reservoir is lower (Figure 13).

The lab analysis of the grab samples provided similar results to the continuous monitoring data (Figure 14, Table 7). At BR01, the continuous monitoring data was the best predictor of suspended solids, but all three measures showed similar patterns.

The longitudinal sampling at the downstream sites (BR02 through BR05) showed relatively low average turbidity levels at all the sites except in May when turbidity was considerably elevated at sites BR04 and BR05 (Figure 15, Table 8).

4.2 Macroinvertebrates

Due to the considerable lab time required, identification of the macroinvertebrates sampled is ongoing and will be reported in a separate, future document.

5.0 REFERENCES

Ecosystems Research Institute. 2006. Quality Assurance Operations Manual.122 pp.

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Montana Fish, Wildlife, and Parks (MFWP). 2007. Montana Fisheries Information System Database Query – Clark Canyon Reservoir and Beaverhead River. MFWP website. http://maps2.nris.state.mt.us/scripts/esrimap.dll?name=MFISH&Cmd=INST

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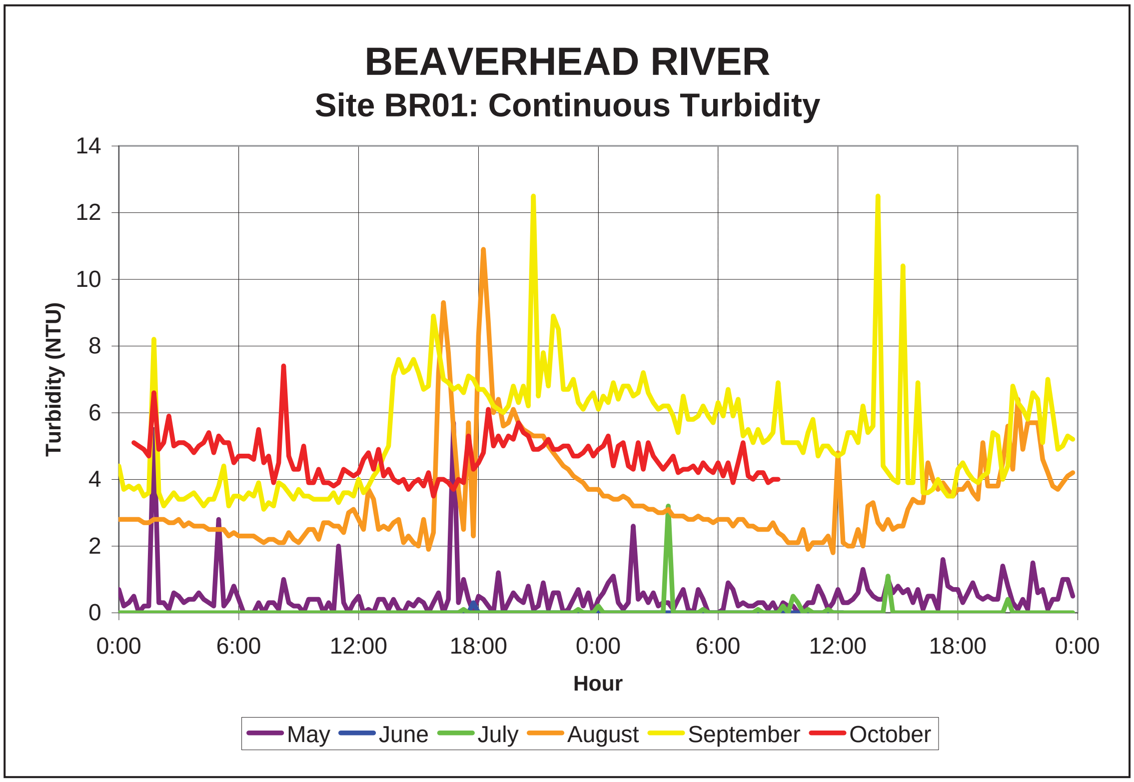

Figure 12. Monthly 48-hour monitoring of turbidity at site BR01 downstream of Clark Canyon Dam on the Beaverhead River.

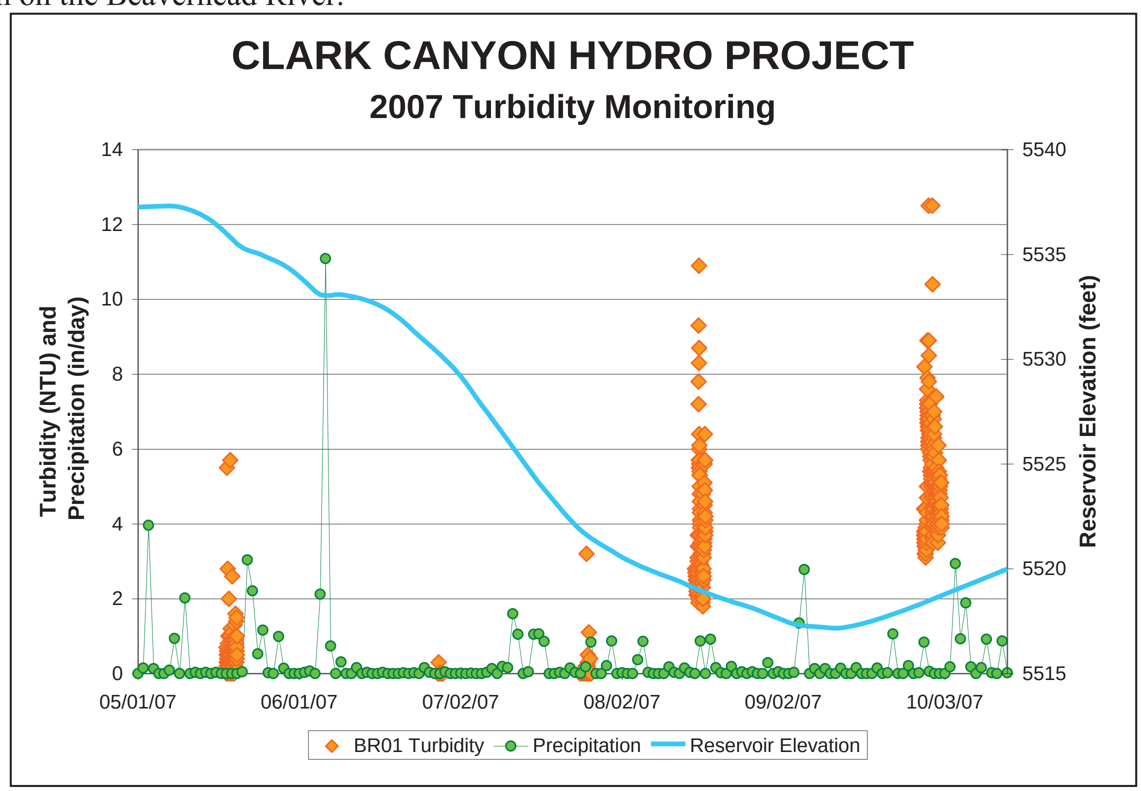

Figure 13. Monthly 48-hr monitoring of turbidity at site BR01 in the context of reservoir elevation and precipitation events.

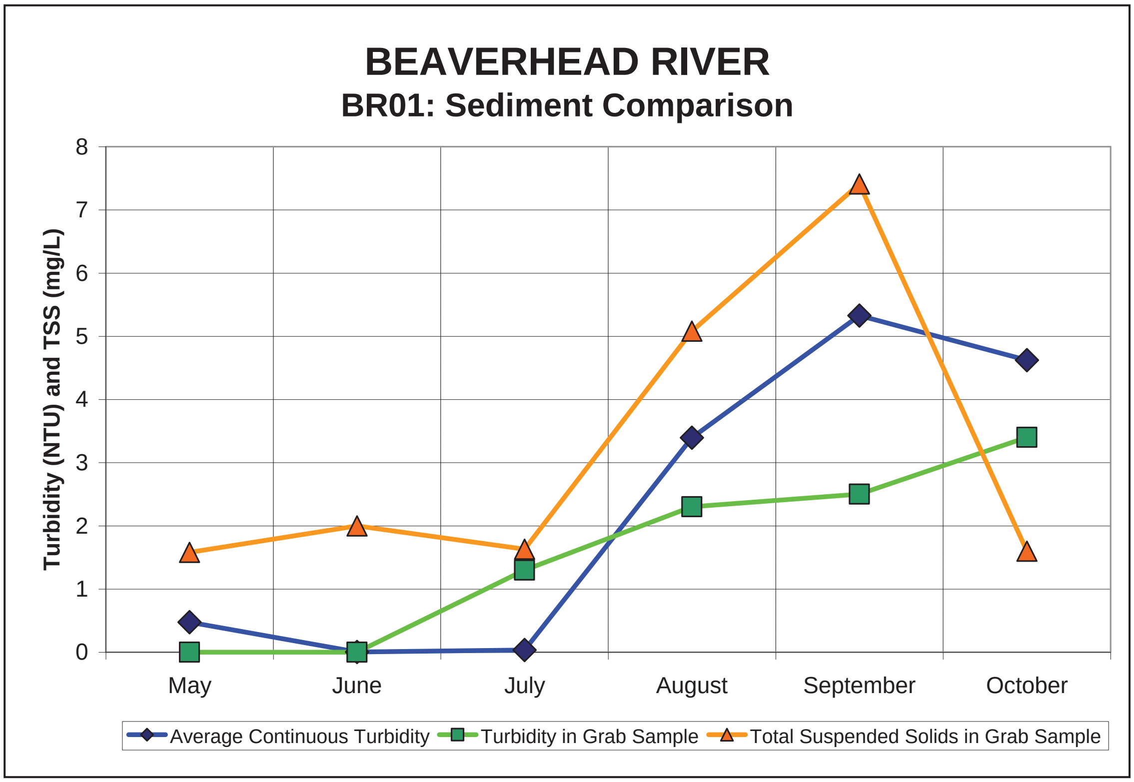

Figure 14. Comparison of measures of sediment during 48-hour monitoring at site BR01.

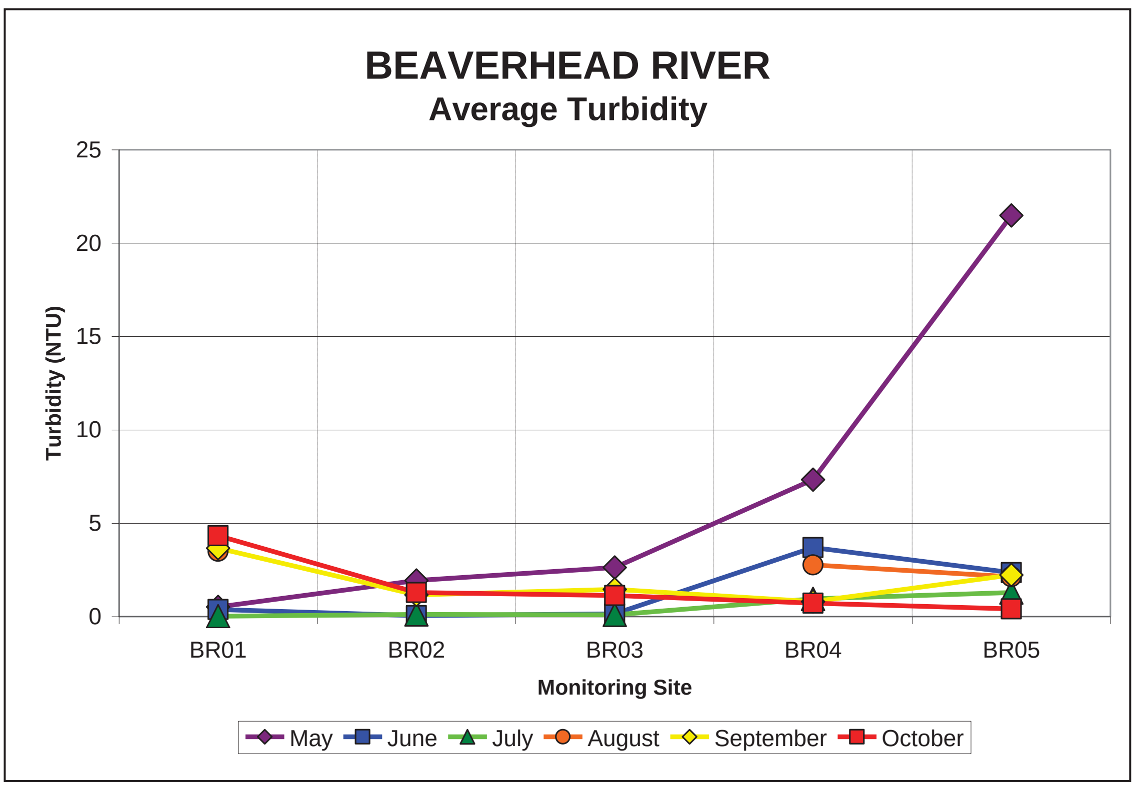

Figure 15. Average turbidity values at the five monitoring sites along the Beaverhead River downstream of Clark Canyon Dam.

Table 5. Maximum total gas pressure and minimum dissolved oxygen at all monitoring sites on the Beaverhead River downstream of Clark Canyon Dam during 2007.

	June	July	August	September	October
Maximum Total Dissolved Gas (% saturation)					
BR01	122	122	111	100	100
BR02	113	108	108	108	109
BR03	112	109	107	103	102
BR04	111	106	109	104	99
BR05	107	97	110	101	100
Minimum Dissolved Oxygen (mg/L)					
BR01	8.39	7.71	8.09	6.38	6.31
BR02	9.85	8.76	9.91	10.37	10.51
BR03	10.25	8.69	10.44	8.04	8.17
BR04	10.79	8.73	10.7	9.40	9.96
BR05	10.02	7.29	11.41	8.00	7.68

Table 6. Comparison of measures of sediment during 48-hour monitoring at site BR01.

	May	June	July	August	September	October
Average Continuous Monitoring Turbidity (NTU)	0.48	0	0.03	3.39	5.33	4.62
Grab Sample Turbidity (NTU)	<1	<1	1.3	2.3	2.5	3.4
Grab Sample TSS (mg/L)	1.58	2	1.63	5.08	7.41	1.6

Table 7. Average turbidity values at the five monitoring sites along the Beaverhead River downstream of Clark Canyon Dam.

	May	June	July	August	September	October
Average Turbidity (NTU)						
BR01	0.51	0.38	0.02	3.5	4.7	4.33
BR02	1.94	0.05	0.11	2.56	1.17	1.29
BR03	2.63	0.15	0.09	2.45	1.46	1.13
BR04	7.33	3.7	0.95	2.77	0.81	0.72
BR05	21.48	2.36	1.29	2.13	2.23	0.41

APPENDIX G
Instream Flow Release Plan

Symbiotics LLC

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SENT ELECTRONICALLY

October 7, 2008

Kimberley D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Clark Canyon Dam Hydroelectric Project,
FERC Project No. 12429 Final Instream Flow Release Plan

Dear Ms. Bose,

Enclosed is our Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project. This plan addresses comments from the Bureau of Reclamation, which were received on September 25, and fulfills the last information request you submitted on May 22, 2008. No other agency comments have been received at this time. We have included Reclamation's comment letter and our responses as appendices to the plan.

If you have any questions please contact the project manager, Keith Lawrence, at keith.lawrence@symbioticsenergy.com or 801-947-0281.

Sincerely,

Brent L. Smith

Brent L. Smith
Chief Executive Officer
Rigby, ID

cc:
enclosure

Clark Canyon Hydroelectric Project

FERC No. 12429-001

Final Instream Flow Release Plan

Symbiotics LLC

October 2008

Clark Canyon Hydroelectric Project
FERC No. 12429-001

Prepared by:

Symbiotics, LLC
P.O. Box 535
Rigby, ID 83442
(208) 745-0834

Version: October 2008

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1.0 INTRODUCTION

On May 22, 2008 the Federal Energy Regulatory Commission (FERC) issued a request to Clark Canyon Hydro, LLC for additional information concerning provision of bypass flows during certain phases of construction of the Clark Canyon Dam Hydroelectric Project No. 12429-001 (Figure 1). The FERC requested that a *Final Instream Flow Release Plan* be developed which addressed the following issues at a minimum:

(a) the preferred alternative for temporary flow bypass of the two alternatives contemplated in the draft plan (pumping throughout the entire temporary flow bypass period, or pumping until 18-inch steel pipes are installed to facilitate temporary flow bypass);

(b) structural and mechanical pumping details and calculations, pipe anchoring details, discharge valving information, the number and size of pumps, discharge capacity ratings, intake and discharge piping details;

(c) if the 18-inch steel pipe alternative is chosen, provide the following: (i) general design drawings and descriptions of how the two temporary 18-inch steel pipes are connected to the existing operating gates; (ii) an explanation of how the bypass water flows into these two 18-inch pipes only during construction and not through the existing arch culvert where the new 9-foot diameter penstock is to be installed; and (iii) a description of the fate of the 18-inch pipes at the end of construction (e.g., would they be removed? filled with grout? used for operational flows?);

(d) an analysis of discharge capacities through the range of potential reservoir elevations; a description of how discharges greater than the pumping and/or 18-inch steel pipes' capacities would be released; a description of how discharges less than 100 cubic feet per second (cfs) would be released during construction; and contingency plans to ensure adequate backup capability should any pumps shut down or the 18-inch pipes fail;

(e) basic engineering calculations showing the velocities at the outlet of the temporary flow bypass 18-inch steel pipes and/or pumping hoses, and any proposed measures to dissipate energy or protect against streambed scour and/or shoreline erosion;

(f) the estimated length of construction and a schedule showing the time of year that the outlet pipe modifications would occur;

(g) a detailed line item estimate of all temporary flow bypass costs during construction including, but not limited to: mobilization/demobilization; pump rental; pump hose line(s) installation and rental; 18-inch steel pipe installation; existing facility additions or modifications (e.g., energy dissipation measures); operation and maintenance; post-construction 18-inch pipe removal/modification; grouting; or any other site restoration.

(h) a statement of who would control the flow releases (Clark Canyon Hydro, LLC or Reclamation) during project construction and operation, and, if applicable, a description of how transitions would be made when flow control is handed back and forth between Clark Canyon Hydro, LLC and Reclamation;

(i) a description of where in the system the flow releases would be controlled during project construction and operations (e.g., at the concrete intake structure/gate chamber or at the new regulating valves at the downstream end of the penstock);

(j) a description of how flow release compliance would be monitored during project construction and operation;

(k) a description of how flow releases less than the 87.5-cfs minimum turbine capacity would be released during project operation, and how flow continuation would be provided during planned or unplanned project shutdowns (e.g., if a unit trips offline); and

(l) a description of detection, notification, and reporting procedures in the event of an emergency situation or unplanned modification to approved project operations.

Please prepare the final instream flow release plan after consultation with Reclamation; U.S. Fish and Wildlife Service (USFWS); Montana Department of Fish, Wildlife, and Parks (MFWP); East Bench Irrigation District (EBID); Clark Canyon Water Supply Company; and Montana Department of Environmental Quality (MDEQ). The plan should include documentation of consultation, copies of comments and recommendations on the plan after it has been prepared and provided to the agencies, and specific descriptions of the agencies' comments and recommendations are accommodated by the plan. Allow the agencies 30 days to comment and to make recommendations on the final plan before filing the plan with the Commission. If you do not adopt an agency recommendation, include in your filing your reasons, based on site-specific information. If the agencies do not reply, you should provide us dated copies of your request for comments.

A draft version of this plan was submitted to the agencies listed above on August 15, 2008. Those letters are included under Appendix C of this plan. The draft plan was intended to address all of the issues listed in the May 22, 2008 FERC AIR. A draft response letter was received from Reclamation on September 25. No other responses have been received at this time. We have included Reclamation's letter and our responses in Appendix D. These responses have been incorporated into the final plan described herein as necessary.

2.0 TEMPORARY INSTREAM BYPASS PUMPING PLAN

During installation and pressure-grouting of steel penstock liner, construction of the bifurcation leading to the powerhouse turbines and installation of associated valves, water will need to be bypassed around the existing penstock to the Beaverhead River. It is estimated that these efforts will require approximately 8 to 12 weeks to complete.

Previously, in its Final License Application and subsequent correspondence with the FERC and resource agencies, Symbiotics (2006) proposed that diesel generator-powered pumps would be used to deliver this water while dual 18-inch steel pipes were installed on either side of the existing penstock to provide flows during the remainder of that phase of construction. That system will no longer be utilized and electrically driven pumps will be used to deliver water from Clark Canyon Reservoir to the Beaverhead River throughout this entire construction phase. When this phase has been completed, release of water through the existing penstock will resume.

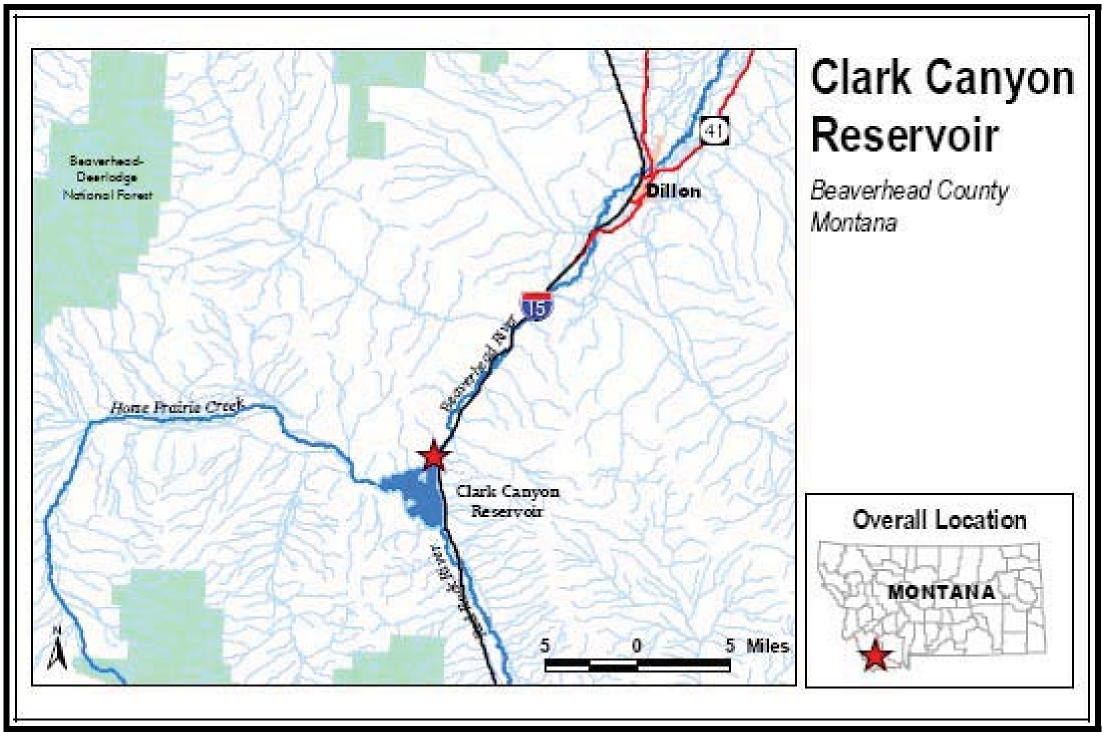


Figure 1. Map detailing project location.

Pumping will occur from October through November of 2009 or 2010, depending on the timing of FERC licensing. Issues of providing the necessary quantity and quality of flows will be optimized during this period. Elevated flows associated with irrigation demands have typically ended by late September. According the Final Environmental Assessment (FEA) and Finding of No Significant Impact (FONSI) for the Clark Canyon Reservoir (Reclamation 2006), guidelines for minimum winter flows during a particular year depend on July-August flows and September storage (Table 1). Ultimately, the decision to continue or discontinue releases for irrigation purposes is determined jointly by Reclamation and the East Bench Joint Board of Control, which is comprised of the East Bench Irrigation District and the Clark Canyon Water Supply Company.

Minimum flows may range from 25 to 200 cfs; however, flows in excess of 100 cfs within the next year or two appear to be unlikely based on recent conditions at the site which have reduced storage to well below 80,000 acre-feet. As of October 1, 2008, reservoir storage was about 65,000 acre-feet (Reclamation 2008). This represents a substantial and steady increase from the September ending low of about 16,000 acre-feet in 2003 (Figure 2). Inflows during July and August have also increased and winter releases have risen accordingly to a level of 100 cfs at present. Although a minimum flow release in excess of 100 cfs is not expected, the Licensee would be prepared to release whatever flow was required during the bypass period.

Table 1. Clark Canyon Reservoir winter release guidelines.

Sept. 1 Storage plus July-August Inflow (Acre-feet)	Minimum Release (cfs)
Less than 80,000	25
80,000 – 130,000	50
130,000 – 160,000	100
Greater than 160,000	200

Pumps would be configured to provide the necessary flows as dictated by Reclamation in advance of any construction activity. Magnetic flow measuring equipment will be installed on each pipe near the electrical intertie panels such that the discharge of each pipe can be measured. Prior to construction, a USGS quality gauging station will be installed immediately downstream of the project. Reclamation would be consulted prior to construction regarding how the exchange of flow releases between the regulating outlet to the pumps and back again would occur and continuous contact between Symbiotics and Reclamation personnel would be maintained during this period. The layout for the pumping system is shown in Appendix A.

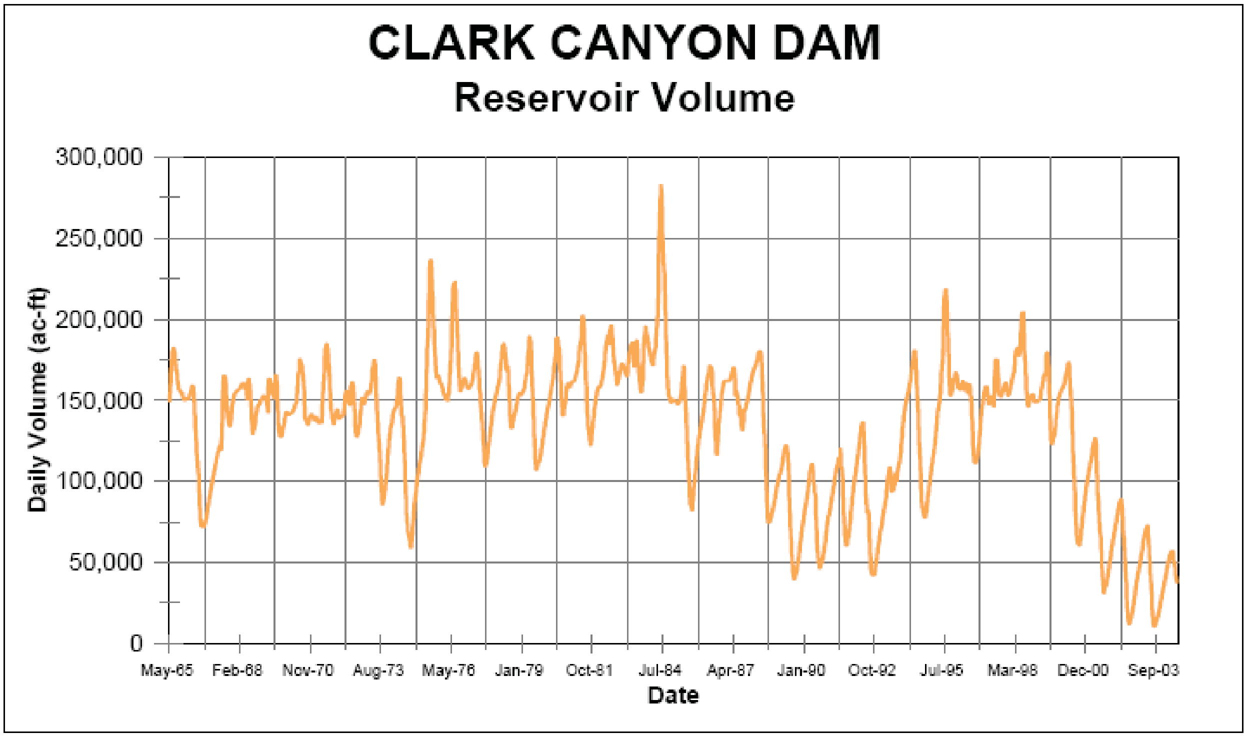


Figure 2. Daily storage in Clark Canyon Reservoir, 1965-2003

Key features include:

- Onsite 480V electricity as a primary power source,
- Diesel generator located above reservoir shoreline as backup power,
- Floating barge to house pumps,
- Shore-to-barge bridge for access and electrical conduit,
- 18-inch pump intake/discharge lines
- Use of spillway as discharge pathway

The proposed location of the backup diesel generator is such that existing road access to the site is available for mobilization of the temporary bypass system and fueling of the generator as required. The proposed unit has integral capacity for 24-hour operation. Additional capacity can be added to the skid system as necessary. The complete unit will be enclosed in a commercial prefabricated spillguard containment unit of sufficient capacity to handle the diesel generator fuel storage. Additionally, an earthen berm will be placed around the generator site. The diesel generator provides the controls for automatic startup and electrical transfer sensing grid failure.

Each pump would be capable of providing approximately 25 cfs. As many pumps as necessary would be utilized to provide the necessary discharge. Intake screens will be an integral part of the pump intake. Additional screening is anticipated and will be installed to meet the requirements of resource agencies.

The pump manufacturers provide custom blanket heaters for the pumps for winter operation, so potential freezing should not be problematic. A check valve is provided at the pump discharge to drain the pipe line and pump in the event of pump shutdown. This should prevent freezing within the pump and pipe line during cold periods. Excessive freezing on the spillway could be addressed by lengthening the outflow pipe so that it reaches the spillway pool.

Backup units are planned to be installed initially for redundancy on the pumping platform. The number of primary and redundant units will be a function of the final specifications and bypass flow requirements. At this time, it is anticipated that most likely one or two pumps will be required; however, cost estimates have been provided for as many as four pumps (Appendix B). Estimates include pre-mobilization, mobilization, equipment rental and other associated costs.

According to previous temperature and dissolved oxygen profiles in Clark Canyon Reservoir (Symbiotics 2007), vertical mixing has occurred by late September (Figures 3 and 4). Therefore, pumping may occur at any reservoir depth during October and November without concern for potential changes in temperature as it relates to downstream releases. As a result, there should be no impacts to temperature during this construction phase. During other phases of construction, releases will occur through the regulating outlet as under existing operations.

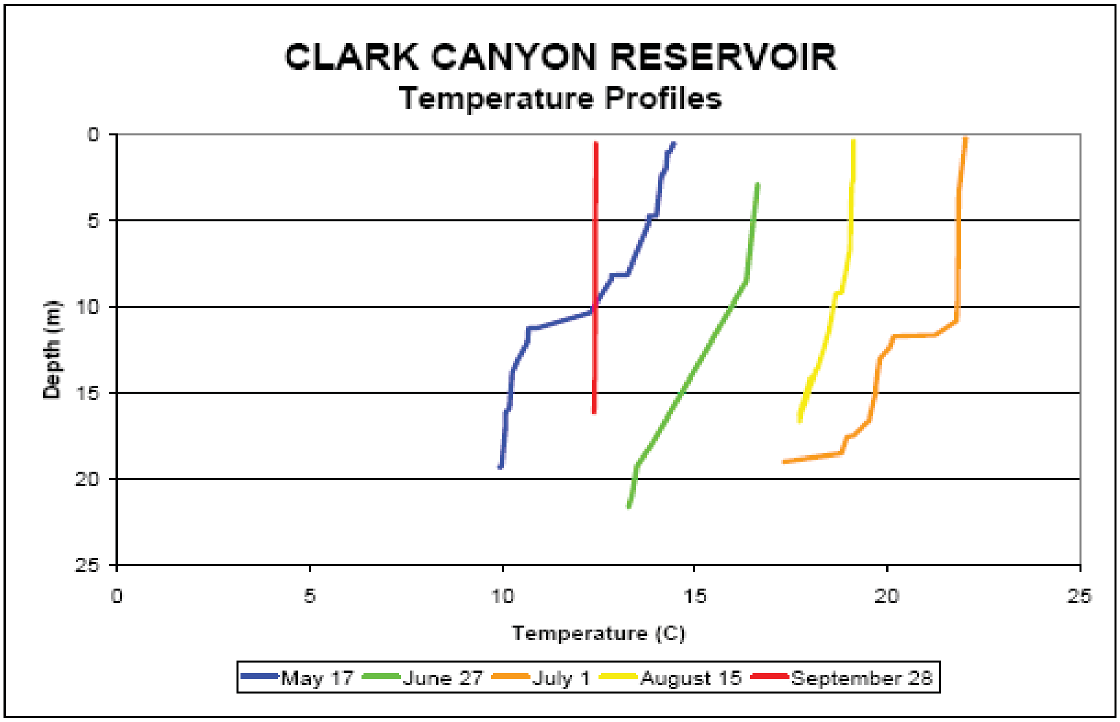


Figure 3. Temperature profiles for Clark Canyon Reservoir during 2007.

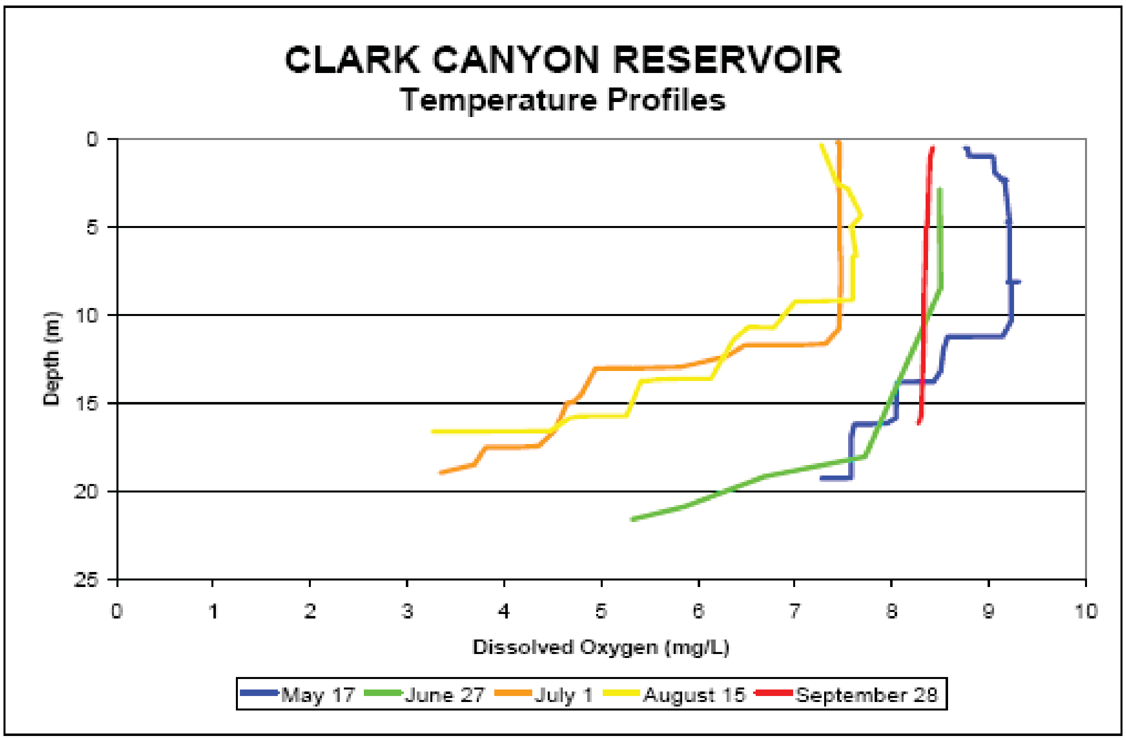


Figure 4. Dissolved oxygen profiles for Clark Canyon Reservoir during 2007.

Releases of water over the spillway will dissipate the energy of falling water which will enter a deep pool located at the base of the spillway. Therefore, there should be no concerns regarding potential scour of the stream bottom. Temperature, dissolved oxygen, total gas pressure and turbidity would be monitored below the project site throughout the entire construction period, not just during the bypass period, to ensure that water quality standards are met. This program has been sent to the resource agencies for review and approval under separate cover as the *Water Quality and Fisheries Protection Plan*.

3.0 PROJECT OPERATION ISSUES

During project operation, one 8-foot diameter and one 6-foot diameter butterfly valve will be located within the powerhouse immediately upstream of the individual turbines and a 9-foot isolation valve has been proposed at the end of the penstock. When flows drop below 87.5 cfs, the minimum operating level, they will be gradually transferred to the main penstock through synchronization between the powerhouse and the penstock valves. As flow is reduced through the powerhouse valves, flow will increase correspondingly through the penstock valve, and vice-versa.

The project will be engineered such that, in the event of emergency shut down or during a drop in flows that precludes power generation, the closure of the powerhouse valves and the return of flows to the normal outlet gates will be automatically synchronized to eliminate the potential for unintended ramping. In short, the powerhouse valves will enter a state known as “free spin”. Turbine free spin is not a part of standard project operation and will only occur as flows transition away from the turbines to the existing outlet gates in the event that the powerhouse shuts down. There will be no transition between pressurized and non-pressurized flows through the regulating outlet once the project is operational. Upon completion of the project, flows exiting the dam will be pressurized at all exit points except for the spillway.

The Island Park Hydroelectric Project (FERC No. 2973) on the Henry's Fork of the Snake River in Idaho was designed in a similar manner. Instream flows immediately below the Island Park project are monitored by a USGS gauging station (No. 13042500) located immediately below the dam and Article 403 of the project's license requires that annual ramping reports be submitted to FERC. No violations of the prescribed ramping rates due to shutdown of the powerhouse for either emergency or routine maintenance purposes have been recorded since the project went online in 1994. Flows at the Clark Canyon Project would also be monitored at USGS No. 06016000 during operation.

A Project Operator would be onsite daily and Reclamation personnel would be notified immediately in the event of an unplanned shutdown or in case of any other type of emergency. Water quality will be monitored minimally during the first year of operation via a program described under the *Water Quality and Fisheries Protection Plan* which will have been reviewed and approved by the resource agencies and the FERC prior to implementation.

4.0 REFERENCES

Symbiotics. 2006. Clark Canyon Dam Hydroelectric Project FERC No. 12429: Final License Application Stage 3 Consultation Document. Prepared by Ecosystems Research Institute and Northwest Power Services. Logan, Utah. July, 2006.

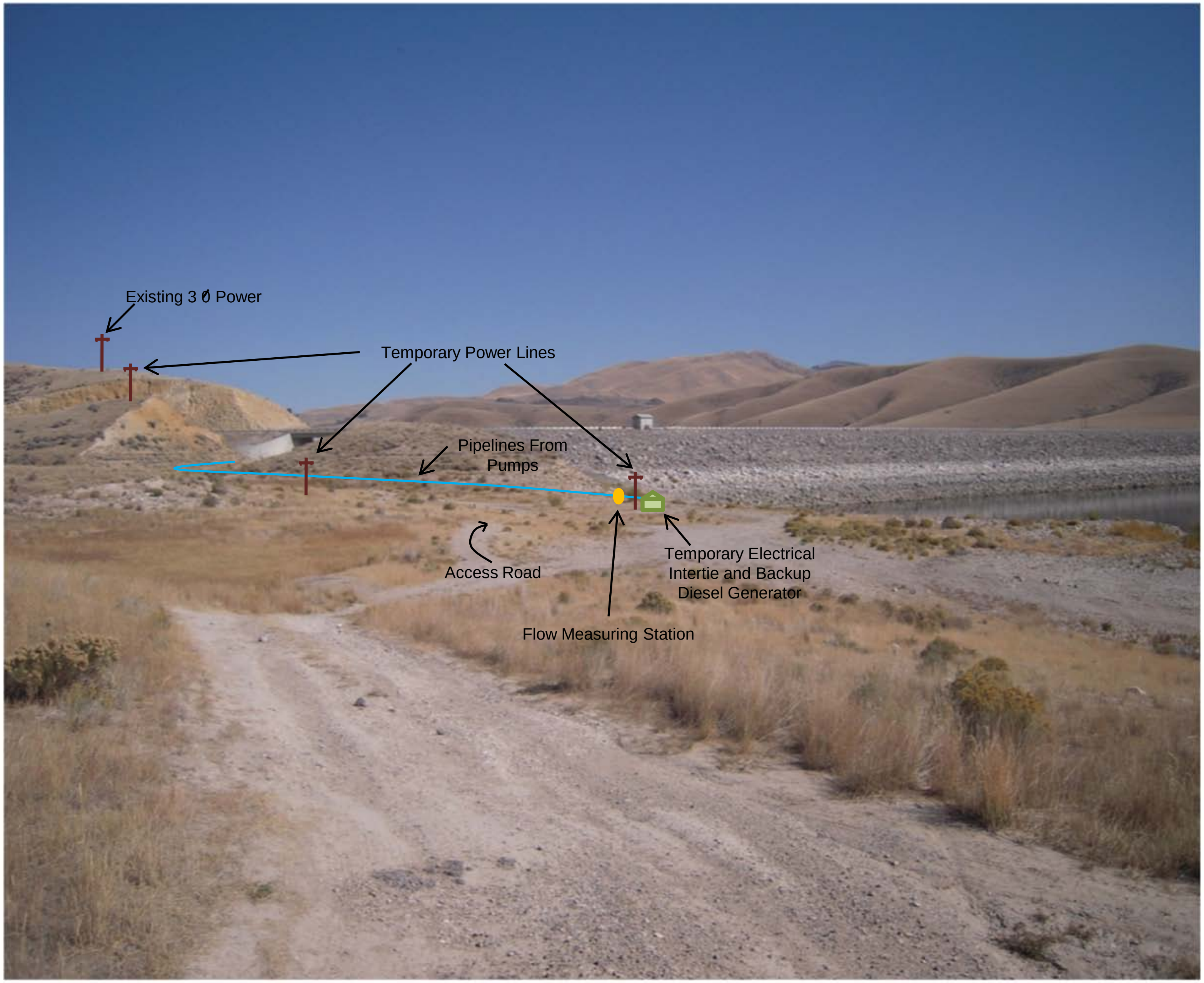
Symbiotics. 2007. Clark Canyon Hydroelectric Project FERC No. 12429-001: Water Quality Monitoring Summary. Prepared by Symbiotics, LLC. Logan, Utah. December, 2007.

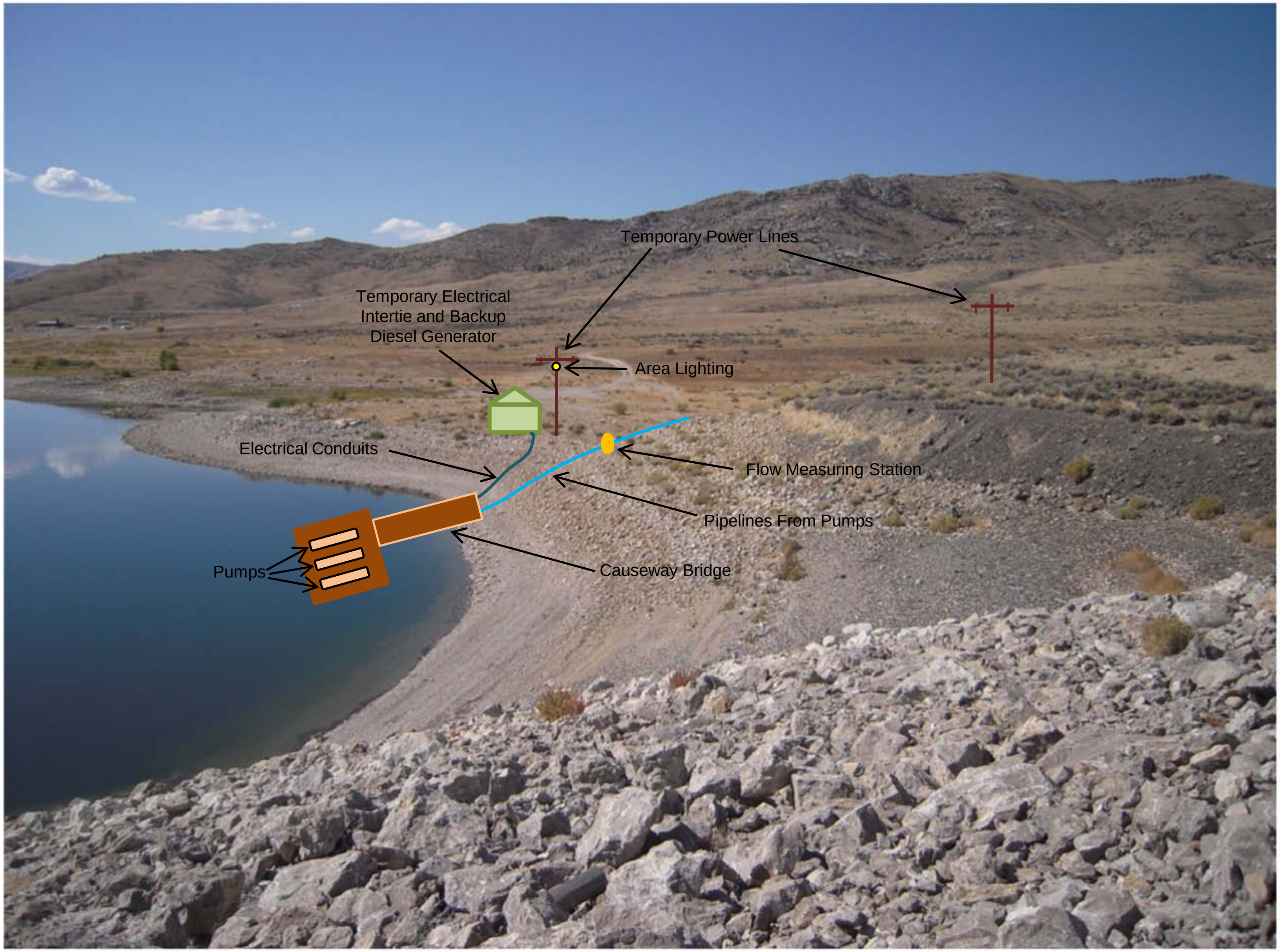
U.S. Bureau of Reclamation (Reclamation). 2008. Current Reservoir Data for Clark Canyon Reservoir, MT as of 08/12/2008. Website: http://www.usbr.gov/gp-bin/arcweb_ccr.pl.

U.S. Bureau of Reclamation (Reclamation). 2006. Final Environmental Assessment and Finding of No Significant Impact: Conversion of Long-Term Water Service Contracts to Repayment Contracts, Clark Canyon Reservoir, Montana. FONSI Reference No. MT231-07-01F.

APPENDIX A

Preliminary Pumping Layout Diagram


Existing 3 Ø Power
Temporary Power Lines
Pipelines From Pumps
Access Road
Temporary Electrical Intertie and Backup Diesel Generator
Flow Measuring Station


Temporary Power Lines
Temporary Electrical
Intertie and Backup
Diesel Generator
Area Lighting
Electrical Conduits
Flow Measuring Station
Pipelines From Pumps
Pumps
Causeway Bridge

APPENDIX B

Preliminary Pumping Costs During Project Construction

Fixed Costs (2008 dollars)

Phase	Item	Cost	Units	Total
Pre-mobilization	Barge Fabrication	$35,000	1	$35,000
	Power Line Extension	$50,000	1	$50,000
				$15,000
	Weather Shed	$15,000	1	
Mobilization	Site Preparation	$5,000	1	$5,000
	Freight Pump and Generation	$8,000	1	$8,000
		$2,000		
	Total Installation		1	$2,000
Sub-total				$115,000

Variable Costs (per month)

Description	Item	Cost	Units	Total
Equipment Rental	18-inch Discharge Pipe	$5	200	$1,000
	Electric Pump	$12,000	1	$12,000
	Operating Cost	$6,500	1	$6,500
Additional	Backup Diesel Generator	$3,000	1	$3,000
	Spill Guard	$500	1	$500
Sub-total				$23,000

	No. Pumps (@ 25 cfs per pump)			
	1	**2**	**3**	**4**
Fixed Costs	$115,000	$115,000	$115,000	$115,000
Variable Costs	$23,000	$42,500	$62,000	$81,500
Monthly Costs	$138,000	$157,500	$177,000	$196,500

APPENDIX C

Agency Comment Request Letters on Draft Plan

Symbiotics LLC

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503.235.3424

2101 Main St.; Ste 202
Baker City, OR 97814
541.523.0400

Texas Office
5100 San Felipe Unit 244E
Houston, TX 77056
713.840.1489

SENT BY MAIL TO RECIPIENT

August 15, 2008

Regional Fisheries Manager Bruce Rich
Montana Fish, Wildlife & Parks
1400 South 19th
Bozeman, MT 59718

Re: Request for comment on the Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project (FERC #12429)

To Whom It May Concern:

On May 22, 2008 FERC issued a request for additional information regarding the Clark Canyon Dam Hydroelectric Project which stated:

In your response to the Commission's December 21, 2006, Request for Additional Information No. 2 (Temporary Instream Flow Release Plan), you provided a draft plan with limited details on two different potential methods to provide temporary flow bypass during construction, and stated that the specific details of your proposal, including the preferred alternative for providing temporary flow bypass, would be included in a final plan. You indicated that the final plan would be filed with the Commission at least 4 months prior to the start of temporary flow bypass after you hired an engineering firm and construction company, and when the anticipated flow releases for the construction period were available based on the then-current-year's reservoir levels and hydrologic conditions.

The Bureau of Reclamation (Reclamation) comments on your draft plan suggest that sufficient historical Clark Canyon Dam reservoir level and flow release data are available at this time to develop more detailed information on your proposed temporary flow bypass system. Reclamation states that these details are necessary to adequately evaluate any potential environmental impacts of project-related construction and operation on water quality and aquatic resources of the Beaverhead River. We agree with Reclamation that this information is necessary to complete our environmental and economic analysis of your proposed project. Therefore, within 120 days from the date of this letter, please provide a final instream flow release plan. The plan at a minimum should include the following items:

(a) the preferred alternative for temporary flow bypass of the two alternatives contemplated in the draft plan (pumping throughout the entire temporary flow bypass period, or pumping until 18-inch steel pipes are installed to facilitate temporary flow bypass);

(b) structural and mechanical pumping details and calculations, pipe anchoring details, discharge valving information, the number and size of pumps, discharge capacity ratings, intake and discharge piping details;

(c) if the 18-inch steel pipe alternative is chosen, provide the following: (i) general design drawings and descriptions of how the two temporary 18-inch steel pipes are connected to the existing operating gates; (ii) an explanation of how the bypass water flows into these two 18-inch pipes only during construction and not through the existing arch culvert where the new 9-foot diameter penstock is to be installed; and (iii) a description of the fate of the 18-inch pipes at the end of construction (e.g., would they be removed? filled with grout? used for operational flows?);

(d) an analysis of discharge capacities through the range of potential reservoir elevations; a description of how discharges greater than the pumping and/or 18-inch steel pipes' capacities would be released; a description of how discharges less than 100 cubic feet per second (cfs) would be released during construction; and contingency plans to ensure adequate backup capability should any pumps shut down or the 18-inch pipes fail;

(e) basic engineering calculations showing the velocities at the outlet of the temporary flow bypass 18-inch steel pipes and/or pumping hoses, and any proposed measures to dissipate energy or protect against streambed scour and/or shoreline erosion;

(f) the estimated length of construction and a schedule showing the time of year that the outlet pipe modifications would occur;

(g) a detailed line item estimate of all temporary flow bypass costs during construction including, but not limited to: mobilization/demobilization; pump rental; pump hose line(s) installation and rental; 18-inch steel pipe installation; existing facility additions or modifications (e.g., energy dissipation measures); operation and maintenance; post-construction 18-inch pipe removal/modification; grouting; or any other site restoration.

(h) a statement of who would control the flow releases (Clark Canyon Hydro, LLC or Reclamation) during project construction and operation, and, if applicable, a description of how transitions would be made when flow control is handed back and forth between Clark Canyon Hydro, LLC and Reclamation;

(i) a description of where in the system the flow releases would be controlled during project construction and operations (e.g., at the concrete intake structure/gate chamber or at the new regulating valves at the downstream end of the penstock);

(j) a description of how flow release compliance would be monitored during project construction and operation;

(k) a description of how flow releases less than the 87.5-cfs minimum turbine capacity would be released during project operation, and how flow continuation would be provided during planned or unplanned project shutdowns (e.g., if a unit trips offline); and

(l) a description of detection, notification, and reporting procedures in the event of an emergency situation or unplanned modification to approved project operations.

Please prepare the final instream flow release plan after consultation with Reclamation; U.S. Fish and Wildlife Service (FWS); Montana Department of Fish, Wildlife, and Parks (Montana DFWP); East Bench Irrigation District (EBID); Clark Canyon Water Supply Company; and Montana Department of Environmental Quality (Montana DEQ). The plan should include documentation of consultation, copies of comments and recommendations

on the plan after it has been prepared and provided to the agencies, and specific descriptions of the agencies' comments and recommendations are accommodated by the plan. Allow the agencies 30 days to comment and to make recommendations on the final plan before filing the plan with the Commission. If you do not adopt an agency recommendation, include in your filing your reasons, based on site-specific information. If the agencies do not reply, you should provide us dated copies of your request for comments.

Symbiotics is therefore soliciting comments regarding this Final Instream Flow Release Plan. Reponses are requested within 30 days of receipt of this letter so that the September 19 deadline to provide this information to the FERC may be met. Please send your comments to:

Mr. Brent Smith
Symbiotics LLC
P.O. Box 535
Rigby, ID 83442
Brent.smith@sysmbioticsenergy.com

Feel free to contact me if you have any questions at 801-947-0281 or keith.lawrence@symbioticsenergy.com.

Sincerely,

Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

enclosure

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SENT BY MAIL TO RECIPIENT

August 15, 2008

Chris Gomer
Bureau of Reclamation
P.O. Box 36900
Billings, MT 59107

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P.O. Box 535
Rigby, ID 83442
Brent.smith@sysmbioticsenergy.com

Feel free to contact me if you have any questions at 801-947-0281 or keith.lawrence@symbioticsenergy.com.

Sincerely,

Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

enclosure

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SENT BY MAIL TO RECIPIENT

August 15, 2008

Chief Glenn Phillips
Montana Fish, Wildlife & Parks
1420 6th Avenue, East
Helena, MT 59620

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Keith Lawrence
Clark Canyon Project Manager
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SENT BY MAIL TO RECIPIENT

August 15, 2008

Joel Tohtz
Montana Fish, Wildlife & Parks
1400 South 19th
Bozeman, MT 59718

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(g) a detailed line item estimate of all temporary flow bypass costs during construction including, but not limited to: mobilization/demobilization; pump rental; pump hose line(s) installation and rental; 18-inch steel pipe installation; existing facility additions or modifications (e.g., energy dissipation measures); operation and maintenance; post-construction 18-inch pipe removal/modification; grouting; or any other site restoration.

(h) a statement of who would control the flow releases (Clark Canyon Hydro, LLC or Reclamation) during project construction and operation, and, if applicable, a description of how transitions would be made when flow control is handed back and forth between Clark Canyon Hydro, LLC and Reclamation;

(i) a description of where in the system the flow releases would be controlled during project construction and operations (e.g., at the concrete intake structure/gate chamber or at the new regulating valves at the downstream end of the penstock);

(j) a description of how flow release compliance would be monitored during project construction and operation;

(k) a description of how flow releases less than the 87.5-cfs minimum turbine capacity would be released during project operation, and how flow continuation would be provided during planned or unplanned project shutdowns (e.g., if a unit trips offline); and

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Please prepare the final instream flow release plan after consultation with Reclamation; U.S. Fish and Wildlife Service (FWS); Montana Department of Fish, Wildlife, and Parks (Montana DFWP); East Bench Irrigation District (EBID); Clark Canyon Water Supply Company; and Montana Department of Environmental Quality (Montana DEQ). The plan should include documentation of consultation, copies of comments and recommendations

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P.O. Box 535
Rigby, ID 83442
Brent.smith@sysmbioticsenergy.com

Feel free to contact me if you have any questions at 801-947-0281 or keith.lawrence@symbioticsenergy.com.

Sincerely,

Keith Lawrence

Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

enclosure

Symbiotics LLC

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Texas Office
5100 San Felipe Unit 244E
Houston, TX 77056
713.840.1489

SENT BY MAIL TO RECIPIENT

August 15, 2008

Nancy Johnson
Montana DEQ
P.O. Box 200901
Helena, MT 59620

Re: Request for comment on the Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project (FERC #12429)

To Whom It May Concern:

On May 22, 2008 FERC issued a request for additional information regarding the Clark Canyon Dam Hydroelectric Project which stated:

In your response to the Commission's December 21, 2006, Request for Additional Information No. 2 (Temporary Instream Flow Release Plan), you provided a draft plan with limited details on two different potential methods to provide temporary flow bypass during construction, and stated that the specific details of your proposal, including the preferred alternative for providing temporary flow bypass, would be included in a final plan. You indicated that the final plan would be filed with the Commission at least 4 months prior to the start of temporary flow bypass after you hired an engineering firm and construction company, and when the anticipated flow releases for the construction period were available based on the then-current-year's reservoir levels and hydrologic conditions.

The Bureau of Reclamation (Reclamation) comments on your draft plan suggest that sufficient historical Clark Canyon Dam reservoir level and flow release data are available at this time to develop more detailed information on your proposed temporary flow bypass system. Reclamation states that these details are necessary to adequately evaluate any potential environmental impacts of project-related construction and operation on water quality and aquatic resources of the Beaverhead River. We agree with Reclamation that this information is necessary to complete our environmental and economic analysis of your proposed project. Therefore, within 120 days from the date of this letter, please provide a final instream flow release plan. The plan at a minimum should include the following items:

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(b) structural and mechanical pumping details and calculations, pipe anchoring details, discharge valving information, the number and size of pumps, discharge capacity ratings, intake and discharge piping details;

(c) if the 18-inch steel pipe alternative is chosen, provide the following: (i) general design drawings and descriptions of how the two temporary 18-inch steel pipes are connected to the existing operating gates; (ii) an explanation of how the bypass water flows into these two 18-inch pipes only during construction and not through the existing arch culvert where the new 9-foot diameter penstock is to be installed; and (iii) a description of the fate of the 18-inch pipes at the end of construction (e.g., would they be removed? filled with grout? used for operational flows?);

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Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

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SENT BY MAIL TO RECIPIENT

August 15, 2008

Fisheries Biologist Richard Oswald
Montana Fish, Wildlife & Parks
1400 South 19th
Bozeman, MT 59718

Re: Request for comment on the Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project (FERC #12429)

To Whom It May Concern:

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Sincerely,

Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

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SENT BY MAIL TO RECIPIENT

August 15, 2008

Rob Hazlewood
US Fish and Wildlife Service –
Montana Ecological Services Field Office
100 North Park, Suite 320
Helena, MT 59601

Re: Request for comment on the Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project (FERC #12429)

To Whom It May Concern:

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Logan, Utah

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SENT BY MAIL TO RECIPIENT

August 15, 2008

To Whom It May Concern
US Fish and Wildlife Service, Region 6
P.O. Box 25486
Denver, CO 80025

Re: Request for comment on the Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project (FERC #12429)

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Keith Lawrence

Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

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SENT BY MAIL TO RECIPIENT

August 15, 2008

To Whom It May Concern
East Bench Irrigation District
1200 Highway 41
Dillon, MT 59725

Re: Request for comment on the Final Instream Flow Release Plan for the Clark Canyon Dam Hydroelectric Project (FERC #12429)

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(c) if the 18-inch steel pipe alternative is chosen, provide the following: (i) general design drawings and descriptions of how the two temporary 18-inch steel pipes are connected to the existing operating gates; (ii) an explanation of how the bypass water flows into these two 18-inch pipes only during construction and not through the existing arch culvert where the new 9-foot diameter penstock is to be installed; and (iii) a description of the fate of the 18-inch pipes at the end of construction (e.g., would they be removed? filled with grout? used for operational flows?);

(d) an analysis of discharge capacities through the range of potential reservoir elevations; a description of how discharges greater than the pumping and/or 18-inch steel pipes' capacities would be released; a description of how discharges less than 100 cubic feet per second (cfs) would be released during construction; and contingency plans to ensure adequate backup capability should any pumps shut down or the 18-inch pipes fail;

(e) basic engineering calculations showing the velocities at the outlet of the temporary flow bypass 18-inch steel pipes and/or pumping hoses, and any proposed measures to dissipate energy or protect against streambed scour and/or shoreline erosion;

(f) the estimated length of construction and a schedule showing the time of year that the outlet pipe modifications would occur;

(g) a detailed line item estimate of all temporary flow bypass costs during construction including, but not limited to: mobilization/demobilization; pump rental; pump hose line(s) installation and rental; 18-inch steel pipe installation; existing facility additions or modifications (e.g., energy dissipation measures); operation and maintenance; post-construction 18-inch pipe removal/modification; grouting; or any other site restoration.

(h) a statement of who would control the flow releases (Clark Canyon Hydro, LLC or Reclamation) during project construction and operation, and, if applicable, a description of how transitions would be made when flow control is handed back and forth between Clark Canyon Hydro, LLC and Reclamation;

(i) a description of where in the system the flow releases would be controlled during project construction and operations (e.g., at the concrete intake structure/gate chamber or at the new regulating valves at the downstream end of the penstock);

(j) a description of how flow release compliance would be monitored during project construction and operation;

(k) a description of how flow releases less than the 87.5-cfs minimum turbine capacity would be released during project operation, and how flow continuation would be provided during planned or unplanned project shutdowns (e.g., if a unit trips offline); and

(l) a description of detection, notification, and reporting procedures in the event of an emergency situation or unplanned modification to approved project operations.

Please prepare the final instream flow release plan after consultation with Reclamation; U.S. Fish and Wildlife Service (FWS); Montana Department of Fish, Wildlife, and Parks (Montana DFWP); East Bench Irrigation District (EBID); Clark Canyon Water Supply Company; and Montana Department of Environmental Quality (Montana DEQ). The plan should include documentation of consultation, copies of comments and recommendations

on the plan after it has been prepared and provided to the agencies, and specific descriptions of the agencies' comments and recommendations are accommodated by the plan. Allow the agencies 30 days to comment and to make recommendations on the final plan before filing the plan with the Commission. If you do not adopt an agency recommendation, include in your filing your reasons, based on site-specific information. If the agencies do not reply, you should provide us dated copies of your request for comments.

Symbiotics is therefore soliciting comments regarding this Final Instream Flow Release Plan. Reponses are requested within 30 days of receipt of this letter so that the September 19 deadline to provide this information to the FERC may be met. Please send your comments to:

Mr. Brent Smith
Symbiotics LLC
P.O. Box 535
Rigby, ID 83442
Brent.smith@sysmbioticsenergy.com

Feel free to contact me if you have any questions at 801-947-0281 or keith.lawrence@symbioticsenergy.com.

Sincerely,

Keith Lawrence
Clark Canyon Project Manager
Logan, Utah

enclosure

MT-434
PRJ 18.00 (EB)

Mr. Brent Smith
Symbiotics, LLC
P.O. Box 535
Rigby, ID 83442

Subject: Review of Final Instream Flow Release Plan for the Clark Canyon Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 12429, Pick Sloan Missouri Basin Program, East Bench Unit, Montana (Your August 14, 2008 Letter)

Dear Mr. Smith:

Thank you for your letter of August 14, 2008 providing a copy of the Final Instream Flow Release Plan (Plan) for the Clark Canyon Hydroelectric Project, FERC Project No. 12429. We have reviewed the draft document and offer the following comments and suggestions for your consideration:

1. General comment regarding the Plan: Reclamation interprets your Plan to be a brief and general overview providing conceptual level information for how you plan to provide releases to the Beaverhead River below Clark Canyon Dam during the proposed construction period as well as permanently following the completion of construction. While we appreciate this information, we will require significantly more detailed information, as indicated in our comments below as well as in our October 22, 2007 letter to you, in order to adequately assess and approve a final Plan.
2. Section 2.0, Temporary Instream Bypass Pumping Plan:
    a. The first paragraph on Page 4 indicates you estimate that installation and grouting of the steel penstock liner in the tunnel and construction of the bifurcation for the powerhouse and installation of associated valves will take a total of approximately six to eight weeks to complete. While no designs have been completed for this project that we are aware of, we believe you may be substantially underestimating the amount of time this work will actually require. This has significant impacts on the time required for temporary bypass pumping operations, which would also increase your projected pumping costs.
    b. The first sentence of the third paragraph indicates the bypass pumping period will occur from October through November. There does not appear to be any consideration or mention of how cold weather may effect the pumping operations or what precautions will be put in place to maintain pumping during freezing weather conditions. Additionally, we are very concerned with the potential for ice to build up in the spillway structure. Please explain how cold weather conditions will be handled during the

pumping period and what measures are planned to minimize ice build-up in the spillway structure.

c. The third sentence of the third paragraph on Page 4 states “Elevated flows associated with irrigation demands have ended by late September.” Depending on circumstances and whether sufficient water supply exists in Clark Canyon Reservoir, continuation of higher flows for irrigation purposes could extend beyond this time frame. The decision to discontinue releases for irrigation purposes are determined jointly by Reclamation and the East Bench Joint Board of Control (EBJBC), comprised of the East Bench Irrigation District (EBID), and the Clark Canyon Water Supply Company (CCWSC).
d. Clarification is required regarding the forth sentence of the third paragraph on Page 4, which states “According the Final Environmental Assessment (FEA)and Finding of No Significant Impact (FONSI) for the Clark Canyon Reservoir (Reclamation 2006), projected minimum winter flows during a particular year would depend on July-August flows and September storage (Table 1).” The information presented in this paragraph as well as Table 1 is identified within the subject EA and FONSI as guidelines to assist the EBJBC in recommending a minimum winter releases. These are not requirements for establishing minimum winter releases.
e. We recommend modifying or removing the last sentence of the third paragraph on Page 4, which states “Currently, reservoir storage is at approximately 67,000 acre-feet (Reclamation 2008).” While this information was correct for a certain date in 2008, it is confusing as presented and leads readers to believe that this is the actual current reservoir storage. On September 16, 2008, the actual storage in Clark Canyon Reservoir storage was about 58887 acre-feet.
f. We recommend updating the information presented in the third paragraph on Page 4 pertaining to Figure 2, as well as Figure 2 on Page 5, to include the reservoir storage volume from 2003 through 2008.
g. There does not appear to be any provisions for measuring pumped flows during the pumping period. Please identify how these flows will be measured at the dam.
h. The second bullet at the top of Page 6, which states “Diesel generator located on dam crest as backup power” conflicts with the Proposed Site Plan in Appendix A. The Site Plan indicates the diesel generator will be located somewhere upstream of the dam in the reservoir area “above top water elevation.” Please clarify where the backup diesel generator will be located.
i. Regarding the backup diesel generator system, the Plan needs to provide details such as how fuel storage will be handled, the quantity of fuel storage planned; how fuel spill containment and cleanup will be addressed; who will receive notifications of any spills, etc. Depending on the amount of storage planned, a Spill Prevention, Control and Countermeasure (SPCC) Plan may also be required. Reclamation will

also need to know how this system will be energized following a power outage that would preclude use of the primary electrical system (i.e., auto-transfer, etc).

j. The second paragraph on Page 6 indicates that each pump would be capable of providing approximately 25 cubic feet-per-second (cfs). We note that this equals about 11,220 gallons-per-minute (gpm). As indicated above in our general comment, we will require detailed information on the pumping system including types of pumps, sizes, rated capacities, piping connections, etc. Additionally, all pumping equipment brought to the site must be free of invasive species. An inspection of all equipment will be required before it will be allowed to be used at the site.
k. The second paragraph on Page 6 indicates that at this time it is anticipated that most likely one or two pumps will be required. Reclamation will require that sufficient backup pumps be available and ready onsite (on standby) to immediately begin pumping should any primary pump(s) malfunction or stop. Waiting to find replacement pumps until after a malfunction has occurred will not be acceptable. Once pumping is initiated, is should be anticipated that full time/24-hour attendance of the pumping system will be required.
l. It should be anticipated that the pump intake lines will require fish screens. Specific details regarding the sizing of the screens will require input from Reclamation and the Montana Fish Wildlife and Parks.
m. Figure 4, Page 7: The heading of the profile displayed should indicate "Dissolved Oxygen" instead of "Temperature Profiles"

3. Section 3.0, Project Operation Flow Issues:
   a. We note that this section provides a very brief and general narrative description of how releases for project operations will be performed following the completion of construction. As we've indicated in previous correspondence to you regarding this project, the design, construction, operation, and maintenance of the proposed hydroelectric facilities are subject to further review and approval by Reclamation should a FERC license be issued for this project. To date only very conceptual level information has been provided for our review. Reclamation will require, at a minimum, that we review detailed project designs and specifications at the 30 percent, 60 percent, 90 percent, and final design stages. Reclamation will require a minimum of 30-45 days review time at each stage. It should be anticipated this phase of the project will require many months to complete. Future objections could be raised, if during later reviews adverse effects to the safety of the existing facility or incompatibility of the operation of the proposed power facilities and Reclamation's Project operations are identified.
   b. It should be anticipated that some or most of Reclamation's existing gate operating system equipment will require modification and possibly replacement with new equipment in order to properly integrate operationally with the proposed powerhouse equipment. Specific requirements can be determined during the design phase of this project

should a FERC license be issued.

c. It should be anticipated that Reclamation will require installation of isolation valve(s) to be located in a Reclamation owned and controlled structure in order to adequately isolate the powerhouse from the existing outlet works system. It should also be anticipated that Reclamation will require ownership and operational control of the isolation valve(s) installed to make discharges to the Beaverhead River during times the powerhouse is off-line. Specific requirements and details will be further evaluated during the design phase of the project should a FERC license be issued.
d. The last sentence of the third paragraph on Page 8 indicates that flows from the completed Clark Canyon project would be monitored at USGS Station No. 06016000. This station is located at Barrett's Diversion Dam, which is approximately 11 miles downstream of Clark Canyon Dam. This station is not capable of accurately monitoring flows from the proposed project due to the presence of numerous tributary streams and springs entering the Beaverhead between Clark Canyon Dam and Barretts Diversion Dam. Installation of flow measurement equipment and/or installation of a water measurement structure immediately below the dam will likely be required.
e. The second sentence of the forth paragraph states "Water quality will be monitored minimally …" We suggest listing the water quality parameters that will be monitored during he first year of operation.

4. Appendix A, Preliminary Pumping Layout Diagram:
    a. Reclamation cannot determine from the sketch exactly where the backup diesel generator will be located, other than it appears to be located somewhere upstream of the spillway intake structure "above top water elevation". Please provide an accurate description and view of where the generator will be located. Include locations of intake and discharge piping; locations for vehicle access for fueling and maintenance purposes; locations of electrical connections/tie-in with the primary power system and/or pumps (conduit runs); size and slope of the generator pad; fuel containment provisions; lighting for nighttime operations; etc.
    b. Please describe and display where the temporary electrical power supplying the switchgear for the pumps will be installed. Include the location(s) of temporary power poles and access roads to the switchgear.
    c. The proposes site plan displays an "average water level/shoreline Elev. 5535.30." This average elevation could be overly optimistic in comparison with actual reservoir levels the last 6 years. The October 1 reservoir elevation from 2006 through 2008 averaged about 5516.5 feet (19 feet lower than displayed on the site plan), and from 2003 through 2005 it averaged about 5497.7 feet (38 feet lower than displayed on the site plan). Depending on the actual October 1 reservoir level at the start of construction, considerably longer pump intake and discharge lines will be necessary, and considerably higher pumping heads will be encountered. This will require larger and/or additional pumps to overcome the

additional head.

Thank you for the opportunity to review your proposed Plan. Please contact Chris Gomer at 406-247-7616 if you have any questions regarding these comments.

Sincerely,

cc: Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street NE
Washington, DC 20426

Mr. Dennis Miotke, Manager
East Bench Irrigation District
1200 Hwy 41
Dillon, MT 59275

Mr. Jerry Mallon, President
Clark Canyon Water Supply Company
1200 Hwy 41
Dillon, MT 59275

bc: GP-2200 (Gomer)
GP-4200 (Davis)
MT-200, 222, -231, -400, -432, -434, -750

APPENDIX D

Symbiotics' Responses to Reclamation Comments on Draft Plan

Responses to Reclamation comment letter (received on September 25, 2008)

1. General comment regarding the Plan: Reclamation interprets your Plan to be a brief and general overview providing conceptual level information for how you plan to provide releases to the Beaverhead River below Clark Canyon Dam during the proposed construction period as well as permanently following the completion of construction. While we appreciate this information, we will require significantly more detailed information, as indicated in our comments below as well as in our October 22, 2007 letter to you, in order to adequately assess and approve a final Plan.

Symbiotics has attempted to provide all of the information that is possible at this early stage of engineering. We have attempted to address the additional information you requested in the following sections of your letter.

2. Section 2.0, Temporary Instream Bypass Pumping Plan:
    a. The first paragraph on Page 4 indicates you estimate that installation and grouting of the steel penstock liner in the tunnel and construction of the bifurcation for the powerhouse and installation of associated valves will take a total of approximately six to eight weeks to complete. While no designs have been completed for this project that we are aware of, we believe you may be substantially underestimating the amount of time this work will actually require. This has significant impacts on the time required for temporary bypass pumping operations, which would also increase your projected pumping costs.

    We acknowledge that these activities may require more time than indicated in the draft plan. We estimate that the total time may be as long as 12 weeks. We understand that time overruns would impacts costs and will address these issues if and when they arise during construction.

    b. The first sentence of the third paragraph indicates the bypass pumping period will occur from October through November. There does not appear to be any consideration or mention of how cold weather may effect the pumping operations or what precautions will be put in place to maintain pumping during freezing weather conditions. Additionally, we are very concerned with the potential for ice to build up in the spillway structure. Please explain how cold weather conditions will be handled during the pumping period and what measures are planned to minimize ice build-up in the spillway structure.

    The pump manufacturers provide custom blanket heaters for the pumps for winter operation. A check valve is provided at the pump discharge to drain the pipe line and pump in the event of pump shutdown. This should prevent freezing within the pump and pipe line during cold periods. Excessive freezing *on the spillway could be addressed by lengthening the outflow pipe so that it reaches the spillway pool.*

c. The third sentence of the third paragraph on Page 4 states "Elevated flows associated with irrigation demands have ended by late September." Depending on circumstances and whether sufficient water supply exists in Clark Canyon Reservoir, continuation of higher flows for irrigation purposes could extend beyond this time frame. The decision to discontinue releases for irrigation purposes are determined jointly by Reclamation and the East Bench Joint Board of Control (EBJBC), comprised of the East Bench Irrigation District (EBID), and the Clark Canyon Water Supply Company (CCWSC).

The sentence has been changed to: "Elevated flows associated with irrigation demands have typically ended by late September, but may extend into October depending on circumstances and whether sufficient water supply exists in Clark Canyon Reservoir." We understand it would be our obligation during construction that necessitates bypass flows to either provide these irrigation flows or delay construction until irrigation flows have been discontinued.

d. Clarification is required regarding the forth sentence of the third paragraph on Page 4, which states "According the Final Environmental Assessment (FEA)and Finding of No Significant Impact (FONSI) for the Clark Canyon Reservoir (Reclamation 2006), projected minimum winter flows during a particular year would depend on July-August flows and September storage (Table 1)." The information presented in this paragraph as well as Table 1 is identified within the subject EA and FONSI as guidelines to assist the EBJBC in recommending a minimum winter releases. These are not requirements for establishing minimum winter releases.

We have changed that section to read: "According the Final Environmental Assessment (FEA) and Finding of No Significant Impact (FONSI) for the Clark Canyon Reservoir (Reclamation 2006), guidelines for minimum winter flows during a particular year depend on July-August flows and September storage (Table 1). Ultimately, the decision to continue or discontinue releases for irrigation purposes is determined jointly by Reclamation and the East Bench Joint Board of Control, which is comprised of the East Bench Irrigation District and the Clark Canyon Water Supply Company."

e. We recommend modifying or removing the last sentence of the third paragraph on Page 4, which states "Currently, reservoir storage is at approximately 67,000 acre-feet (Reclamation 2008)." While this information was correct for a certain date in 2008, it is confusing as presented and leads readers to believe that this is the actual current reservoir storage. On September 16, 2008, the actual storage in Clark Canyon Reservoir storage was about 58887 acre-feet.

We have changed this section to read: states "As of October 1, 2008, reservoir storage was about 65,000 acre-feet (Reclamation 2008)."

f. We recommend updating the information presented in the third paragraph on Page 4 pertaining to Figure 2, as well as Figure 2 on Page 5, to include the reservoir storage volume from 2003 through 2008.

Unfortunately, there was insufficient time to update this figure. We have updated this paragraph to read: "Minimum flows may range from 25 to 200 cfs; however, flows in excess of 100 cfs within the next year of two appear to be unlikely based on recent conditions at the site which have reduced storage to well below 80,000 acre-feet. As of October 1, 2008, reservoir storage was about 65,000 acre-feet (Reclamation 2008). This represents a substantial and steady increase from the September ending low of about 16,000 acre-feet in 2003 (Figure 2). Inflows during July and August have also increased and minimum releases have risen accordingly to a level of 100 cfs at present. Although a minimum flow release in excess of 100 cfs is not expected, the Licensee would be prepared to release whatever flow was required during the bypass period."

g. There does not appear to be any provisions for measuring pumped flows during the pumping period. Please identify how these flows will be measured at the dam.

Magnetic flow measuring equipment will be installed on each pipe near the electrical intertie panels such that the discharge of each pipe can be measured. Prior to construction, a USGS quality gauging station will be installed immediately downstream of the project to measure streamflow.

h. The second bullet at the top of Page 6, which states "Diesel generator located on dam crest as backup power" conflicts with the Proposed Site Plan in Appendix A. The Site Plan indicates the diesel generator will be located somewhere upstream of the dam in the reservoir area "above top water elevation." Please clarify where the backup diesel generator will be located.

The diesel generator will be located on the back side of the dam, just above the high water level on the shoreline as shown in the revised Appendix A. This layout now utilizes schematics overlain on photographs to better illustrate the proposed system.

i. Regarding the backup diesel generator system, the Plan needs to provide details such as how fuel storage will be handled, the quantity of fuel storage planned; how fuel spill containment and cleanup will be addressed; who will receive notifications of any spills, etc. Depending on the amount of storage planned, a Spill Prevention, Control and Countermeasure (SPCC) Plan may also be required. Reclamation will also need to know how this system will be energized following a power outage that would preclude use of the primary electrical system (i.e., auto-transfer, etc).

The proposed location of the backup diesel generator is such that existing road access to the site is available for mobilization of the temporary bypass system and fueling of the generator as required. The proposed unit has integral capacity for 24-hour operation. Additional capacity can be added to the skid system as required. The complete unit will be enclosed in a commercial prefabricated spillguard containment unit of sufficient capacity to handle the diesel generator fuel storage. Additionally, an earthen berm will be placed around the generator site. The diesel generator provides the controls for automatic startup and electrical transfer sensing grid failure.

j. The second paragraph on Page 6 indicates that each pump would be capable of providing approximately 25 cubic feet-per-second (cfs). We note that this equals about 11,220 gallons-per-minute (gpm). As indicated above in our general comment, we will require detailed information on the pumping system including types of pumps, sizes, rated capacities, piping connections, etc. Additionally, all pumping equipment brought to the site must be free of invasive species. An inspection of all equipment will be required before it will be allowed to be used at the site.

Detailed information on the pumping system will be provided as project design is undertaken. Concepts as proposed are based upon manufacturers preliminary design data. All equipment proposed will be cleaned and inspected prior to installation.

k. The second paragraph on Page 6 indicates that at this time it is anticipated that most likely one or two pumps will be required. Reclamation will require that sufficient backup pumps be available and ready onsite (on standby) to immediately begin pumping should any primary pump(s) malfunction or stop. Waiting to find replacement pumps until after a malfunction has occurred will not be acceptable. Once pumping is initiated, is should be anticipated that full time/24-hour attendance of the pumping system will be required.

Backup units are planned to be installed initially for redundancy on the pumping platform. The number of primary and redundant units will be a function of the final specifications and bypass flow requirements.

l. It should be anticipated that the pump intake lines will require fish screens. Specific details regarding the sizing of the screens will require input from Reclamation and the Montana Fish Wildlife and Parks.

Intake screens will be an integral part of the pump intake. Additional screening is anticipated and will be installed to meet the requirements of resource agencies.

m. Figure 4, Page 7: The heading of the profile displayed should indicate "Dissolved Oxygen" instead of "Temperature Profiles"

The Applicant lacks the original figure to make that change; however, it should be noted that the figure heading contains the correct language.

3. Section 3.0, Project Operation Flow Issues:
   a. We note that this section provides a very brief and general narrative description of how releases for project operations will be performed following the completion of construction. As we've indicated in previous correspondence to you regarding this project, the design, construction, operation, and maintenance of the proposed hydroelectric facilities are subject to further review and approval by Reclamation should a FERC license be issued for this project. To date only very conceptual level information has been provided for our review. Reclamation will require, at a minimum, that we review detailed project designs and specifications at the 30 percent, 60 percent, 90 percent, and final design stages. Reclamation will require a minimum of 30-45 days review time at each stage. It should be anticipated this phase of the project will require many months to complete. Future objections could be raised, if during later reviews adverse effects to the safety of the existing facility or incompatibility of the operation of the proposed power facilities and Reclamation's Project operations are identified.

Engineering to date is indeed conceptual, but much more information will be provided after the FERC license is issued. The Applicant will adhere to all Reclamation requirements during the final engineering of this project.

b. It should be anticipated that some or most of Reclamation's existing gate operating system equipment will require modification and possibly replacement with new equipment in order to properly integrate operationally with the proposed powerhouse equipment. Specific requirements can be determined during the design phase of this project should a FERC license be issued.

The Applicant appreciates this information and is prepared to make the necessary modifications after consulting fully with Reclamation during the final engineering process.

c. It should be anticipated that Reclamation will require installation of isolation valve(s) to be located in a Reclamation owned and controlled structure in order to adequately isolate the powerhouse from the existing outlet works system. It should also be anticipated that Reclamation will require ownership and operational control of the isolation valve(s) installed to make discharges to the Beaverhead River during times the powerhouse is off-line. Specific requirements and details will be further evaluated during the design phase of the project should a FERC license be issued.
d. The last sentence of the third paragraph on Page 8 indicates that flows from the completed Clark Canyon project would be monitored at USGS Station No. 06016000. This station is located at Barrett's Diversion Dam, which is approximately 11 miles downstream of Clark Canyon Dam. This station is not capable of accurately monitoring flows from the proposed project due to the presence of numerous tributary streams and springs entering the Beaverhead between Clark Canyon Dam and Barretts Diversion Dam. Installation of flow measurement equipment and/or installation of a water measurement structure immediately below the dam will likely be required.

The Applicant understands and will install a USGS-quality streamflow monitoring station immediately downstream of the project prior to any construction activities.

e. The second sentence of the forth paragraph states "Water quality will be monitored minimally …" We suggest listing the water quality parameters that will be monitored during he first year of operation.

Temperature, dissolved oxygen, total gas pressure and turbidity would be monitored below the project site throughout the entire construction period. The last paragraph under Section 2.0 has been modified to include this information.

4. Appendix A, Preliminary Pumping Layout Diagram:
   a. Reclamation cannot determine from the sketch exactly where the backup diesel generator will be located, other than it appears to be located somewhere upstream of the spillway intake structure "above top water elevation". Please provide an accurate description and view of where the generator will be located. Include locations of intake and discharge piping; locations for vehicle access for fueling and maintenance purposes; locations of electrical connections/tie-in with the primary power system and/or pumps (conduit runs); size and slope of the generator pad; fuel containment provisions; lighting for nighttime operations; etc.
   b. Please describe and display where the temporary electrical power supplying the switchgear for the pumps will be installed. Include the location(s) of temporary power poles and access roads to the switchgear.
   c. The proposes site plan displays an "average water level/shoreline Elev. 5535.30." This average elevation could be overly optimistic in comparison with actual reservoir levels the last 6 years. The October 1 reservoir elevation from 2006 through 2008 averaged about 5516.5 feet (19 feet lower than displayed on the site plan), and from 2003 through 2005 it averaged about 5497.7 feet (38 feet lower than displayed on the site plan). Depending on the actual October 1 reservoir level at the start of construction, considerably longer pump intake and discharge lines will be necessary, and considerably higher pumping heads will be encountered. This will require larger and/or additional pumps to overcome the additional head.

This information has been provided under the revised Appendix A of the final plan.